A Systematic Approach Towards Management of Non ST Elevation ACS

Dr Rishi Sethi

MD,DM,FACC,FESC, FRCP(Edin & Lon.),

FSCAI,FAPSIC,FAMS,FCSI,FISC

Professor -Department of Cardiology

Dean Innovation

Executive Director SIB SHINE

KGMU, Lucknow. India.

Roadmap :-

1. Evaluation of Acute Chest Pain Syndromes.
2. Diagnosis of Non ST Elevation ACS.
3. Risk Stratification – Ischemic Risk vs Bleeding risk.
4. Management Protocols and Flowcharts.
5. Non Atherosclerotic causes of ACS – SCAD and MINOCA.

Epidemiology - Sitting on the volcano

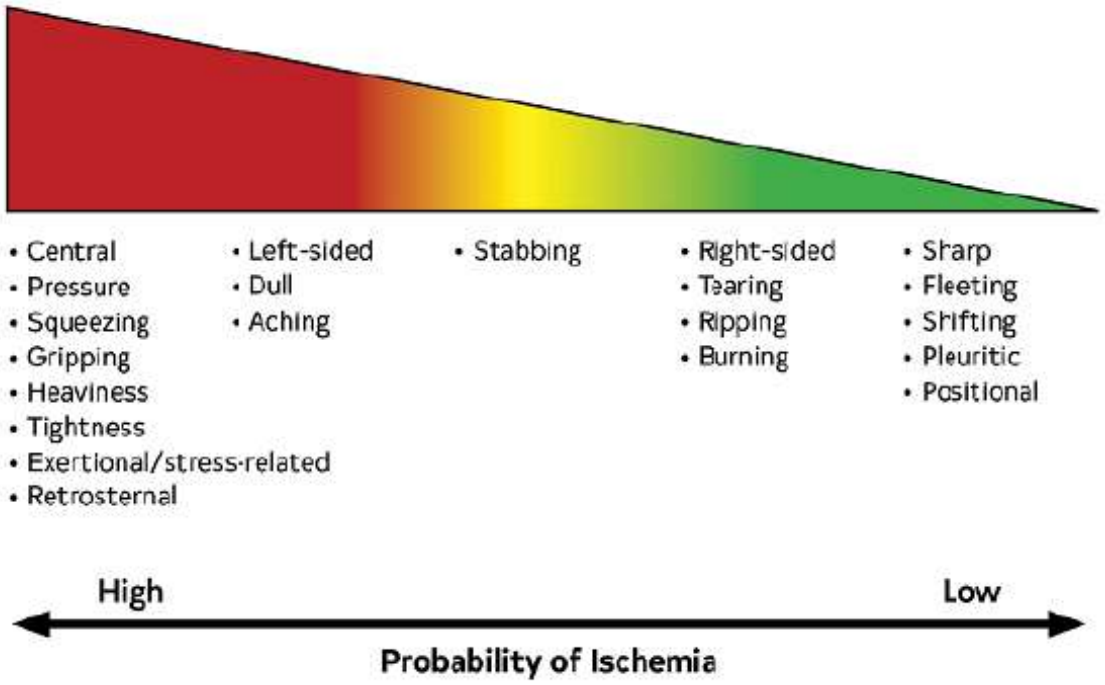
- CAD was the leading cause of deaths (18% of all deaths) while stroke was the fifth leading cause (7% of total deaths) in India in 2016.

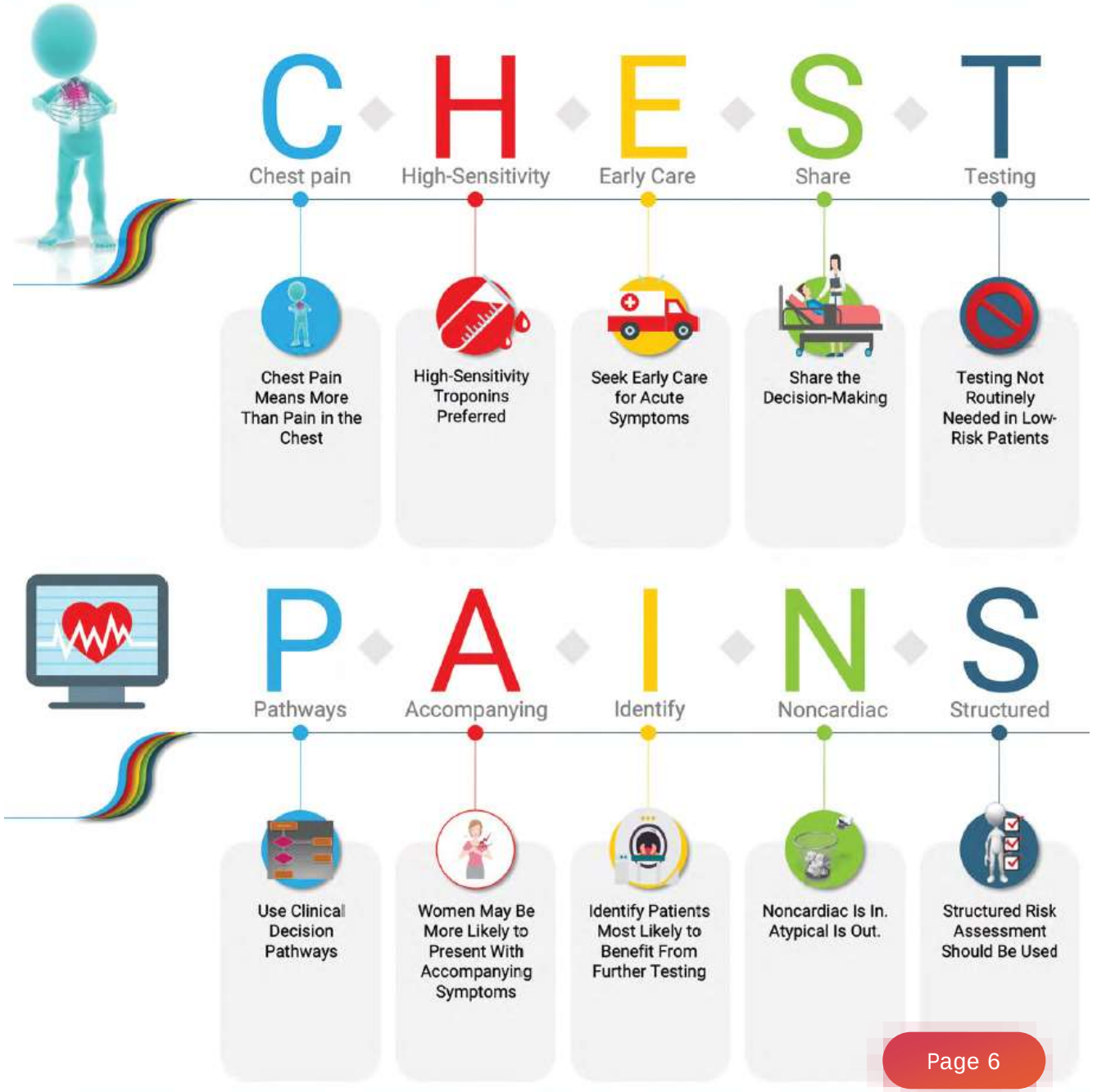
- CAD in young people (aged <45 years in men and <50 years in women) is strikingly more common in Indians – 10% to 15% of all CAD – compared to 2% – 5% reported in Western populations

- Kerala ACS registry – 40 % STEMI

- CREATE Registry- 60% STEMI

2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

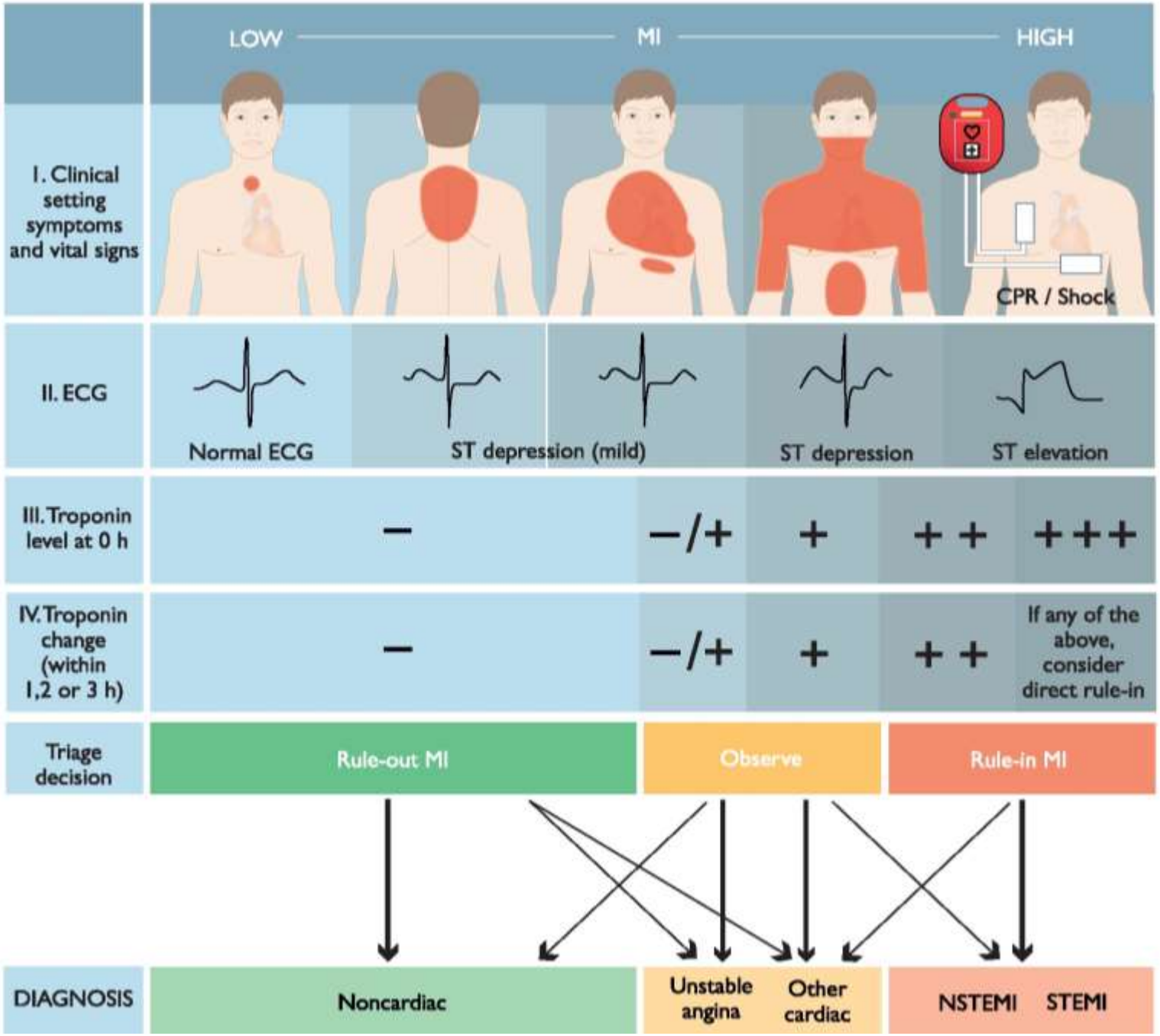




Diagnosis:-

ACS

- Noncardiac
- NSTE ACS
- STEMI



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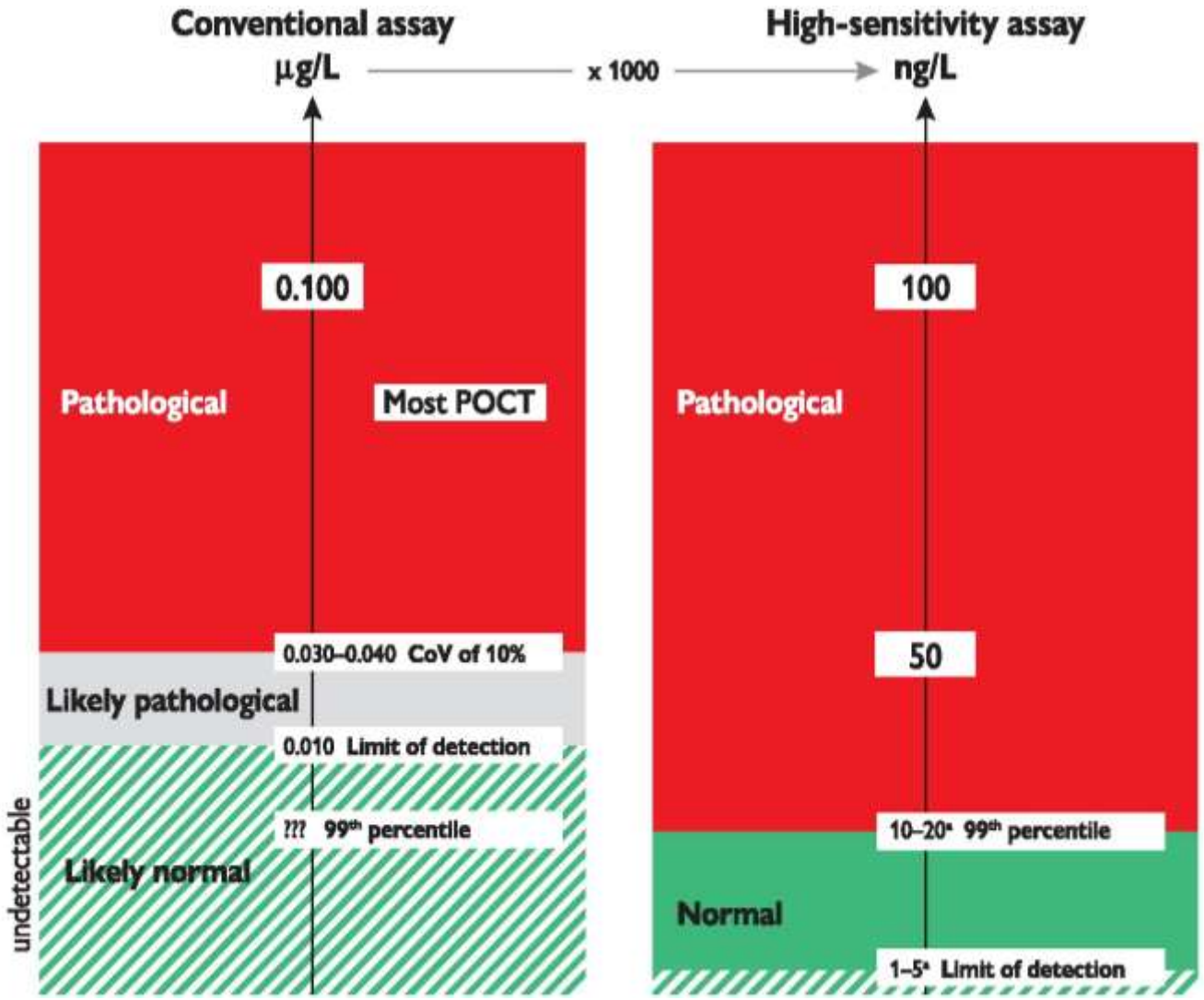
Biomarkers: HS cTn



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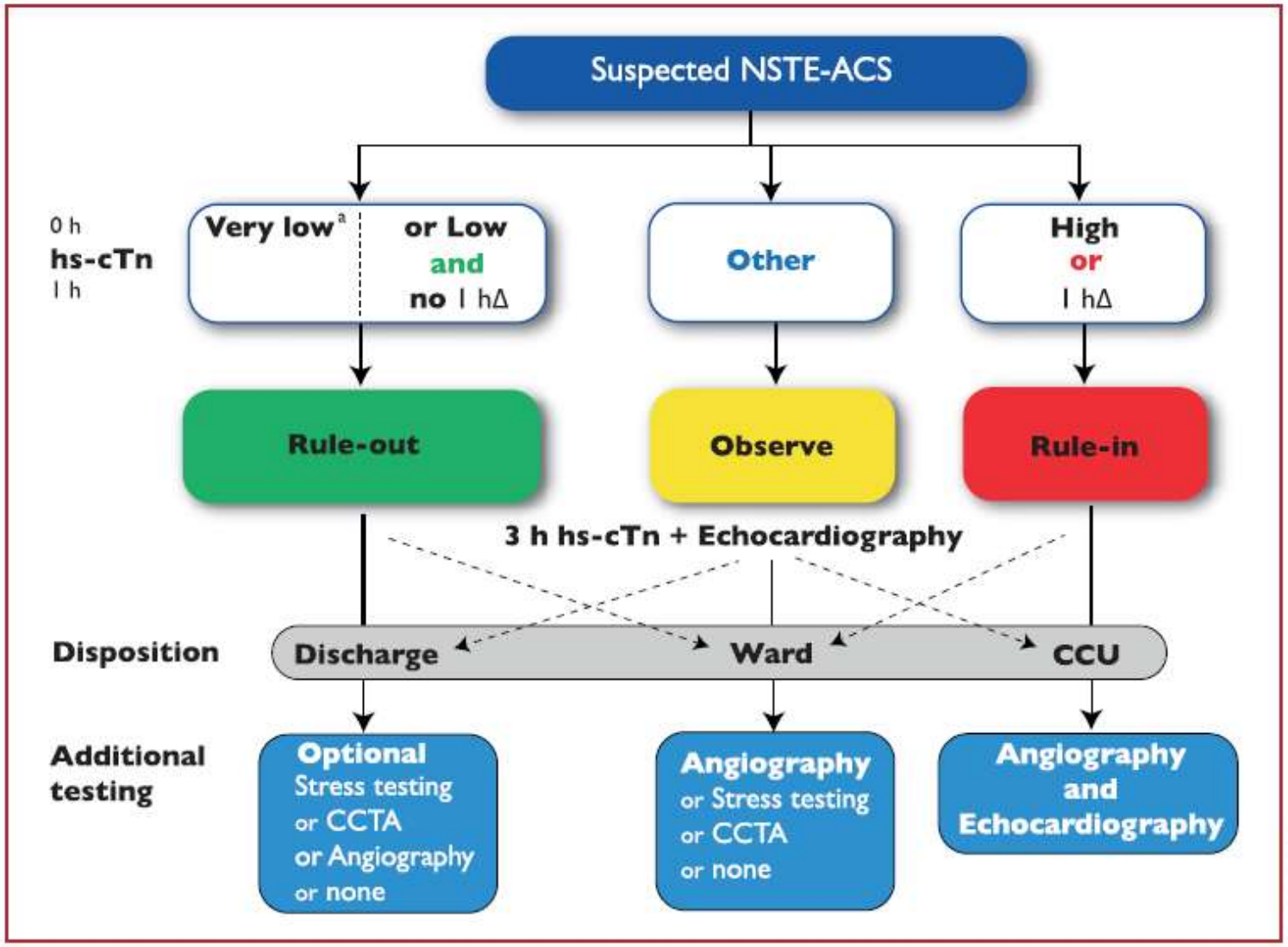
Rapid Rule-in/out Algorithm



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Tachyarrhythmias
Heart failure
Hypertensive emergencies
Critical illness (e.g. shock/sepsis/burns)
Myocarditis[a]
Takotsubo syndrome
Valvular heart disease (e.g. aortic stenosis)
Aortic dissection
Pulmonary embolism, pulmonary hypertension
Renal dysfunction and associated cardiac disease
Acute neurological event (e.g. stroke or subarachnoid haemorrhage)
Cardiac contusion or cardiac procedures (CABG, PCI, ablation, pacing, cardioversion, or endomyocardial biopsy)
Hypo- and hyperthyroidism
Infiltrative diseases (e.g. amyloidosis, haemochromatosis, sarcoidosis, scleroderma)
Myocardial drug toxicity or poisoning (e.g. doxorubicin, 5-fluorouracil, herceptin, snake venoms)
Extreme endurance efforts
Rhabdomyolysis

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Guidelines

Imaging		
In patients presenting with cardiac arrest or haemodynamic instability of presumed cardiovascular origin, echocardiography is recommended and should be performed by trained physicians immediately following a 12-lead ECG.	I	C
In patients with no recurrence of chest pain, normal ECG findings, and normal levels of cardiac troponin (preferably high sensitivity), but still with a suspected ACS a non-invasive stress test (preferably with imaging) for inducible ischaemia or CCTA is recommended before deciding on an invasive approach.[91,92,98,101,105–108]	I	B
Echocardiography is recommended to evaluate regional and global LV function and to rule in or rule out differential diagnoses.[c]	I	C
CCTA is recommended as an alternative to ICA to exclude ACS when there is a low-to-intermediate likelihood of CAD and when cardiac troponin and/or ECG are normal or inconclusive.[105,108,110–114]	I	A

Guidelines

JACC
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

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Journal of the American College of Cardiology
Volume 75, Issue 5, February 2020
DOI: 10.1016/j.jacc.2019.12.012

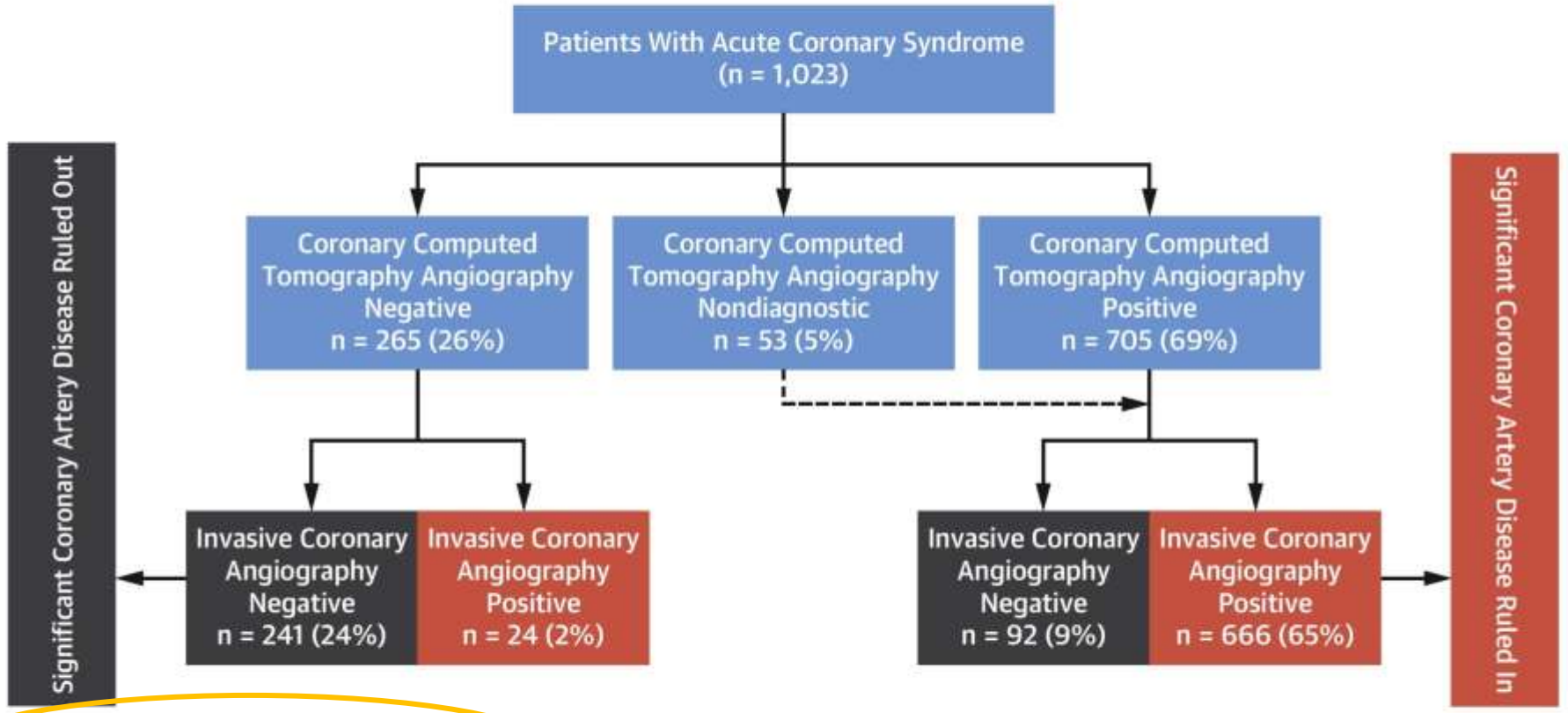
PDF Article

ORIGINAL INVESTIGATION

Coronary CT Angiography in Patients With Non-ST-Segment Elevation Acute Coronary Syndrome

Jesper J. Linde, Henning Kelbæk, Thomas F. Hansen, Per E. Sigvardsen, Christian Torp-Pedersen, Jan Bech, Merete Heitmann, Olav W. Nielsen, Dan Høfsten, Jørgen T. Kühl, Ilan E. Raymond, Ole P. Kristiansen, Ida H. Svendsen, Maria H.D. Vall-Lamora, Charlotte Kragelund, Martina de Knegt, Jens D. Hove, Tem Jørgensen, Gitte G. Fornitz, Rolf Steffensen, Birgit Jurlander, Jawdat Abdulla, Stig Lyngbæk, Hanne Elming, Susette K. Therkelsen, Erik Jørgensen, Lene Kløvgaard, Lia Evi Bang, Peter Riis Hansen, Steffen Helqvist, Søren Galatius, Frants Pedersen, Ulrik Abildgaard, Peter Clemmensen, Kari Saunamäki, Lene Holmvang, Thomas Engstrøm, Gunnar Gislason, Lars V. Køber and Klaus F. Kofoed

CENTRAL ILLUSTRATION: Diagnostic Accuracy of Coronary Computed Tomography Angiography Using Invasive Coronary Angiography as Reference Standard



Negative Predictive Value (95% CI)	90.9% (86.8-94.1)
Sensitivity (95% CI)	96.5% (94.9-97.8)
Positive Predictive Value (95% CI)	87.9% (85.3-90.9)
Specificity (95% CI)	72.4% (67.2-77.1)

Linde, J.J. et al. J Am Coll Cardiol. 2020;75(5):453-63.

RISK ASSESMENT

Specific
ECG patterns

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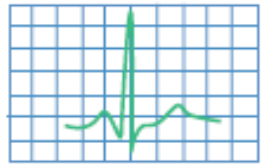
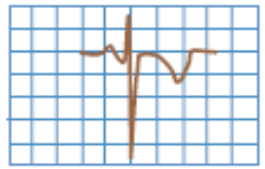
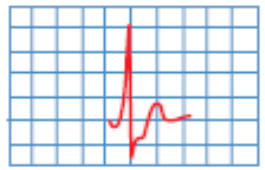
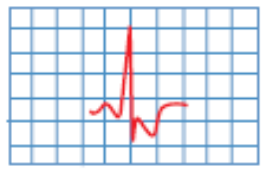
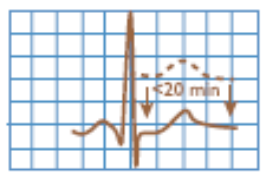
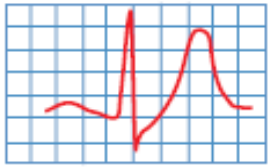
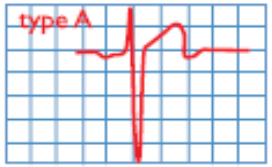
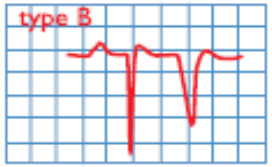
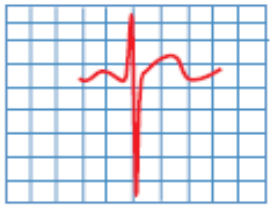
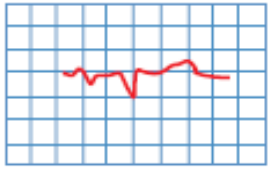
Additional
Biomarkers

Clinical scores:
Grace

Bleeding risk /
Ischemic risk

	ECG pattern	Criteria	Signifying	Figure
a	Normal ECG		No clue	 every lead
b	Isolated T-wave inversion	T-wave inversion >1 mm in ≥5 leads considering I, II, aVL, and V2–V6	Only mildly impaired prognosis	 I, II, aVL, or V2 to V6
c	ST-segment depression	J point depressed by ≥0.05 mm in leads V2 and V3 or ≥1 mm in all other leads followed by a horizontal or downsloping ST-segment for ≥0.08 s in ≥1 leads (except aVR)	More severe ischaemia	 every lead  every lead
d	Transient ST-segment elevation	ST-segment elevation in ≥2 continuous leads of ≥0.25 mV in men <40 years, ≥2 mm in men ≥40 years, or ≥0.15 mV in women in leads V2 through V3 and/or ≥0.1 mV in other leads lasting <20 min	Only mildly impaired prognosis	 every lead

e	De Winter ST-T	1–3 mm upsloping ST-segment depression at the J point in leads V1–V6 that continue into tall, positive, and symmetrical T waves	Proximal LAD occlusion/severe stenosis	
f g	Wellens sign	isoelectric or minimally elevated J point (<1 mm) + biphasic T wave in leads V2 and V3 (type A) or symmetric and deeply inverted T waves in leads V2 and V3, occasionally in leads V1, V4, V5, and V6 (type B)	Proximal LAD occlusion/severe stenosis	 
h	Resting U wave inversion	discrete negative deflection in the T-P segment (negative in comparison to the following P-R segment) no initial positive U wave deflection not obscured by fusion with terminal T wave or following P wave in I, aVL, and V4 through V6	Occlusion or severe stenosis of the left main artery or LAD	
i	Low QRS voltage	peak to peak QRS complex voltage <0.5 mV in all limb leads and <1.0 mV in all precordial leads	High risk for in-hospital mortality	

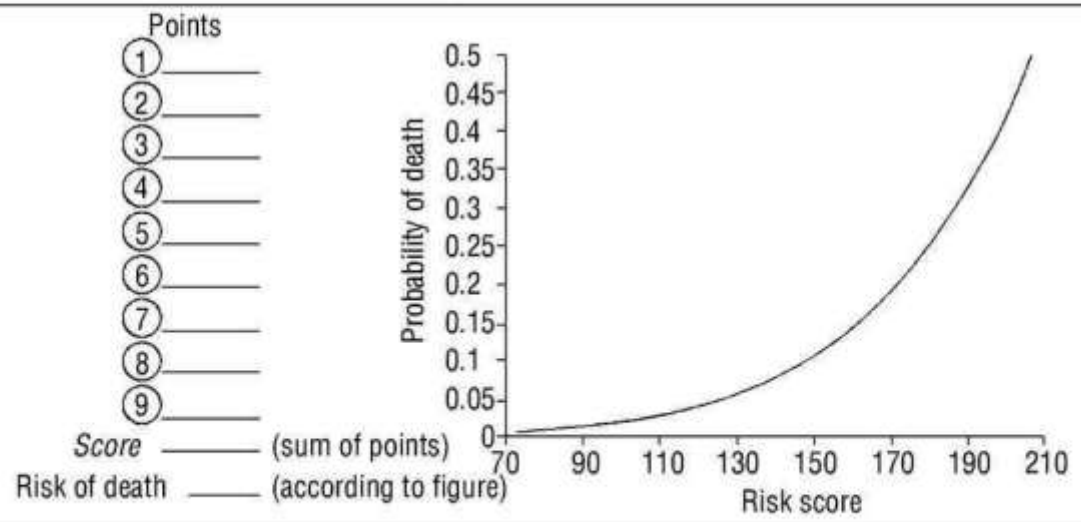
Risk Stratification:-

Recommendations	Class[a]	Level[b]
Beyond its diagnostic role, it is recommended to measure hs-cTn serially for the estimation of prognosis.[12,13,119,120]	I	B
Measuring BNP or NT-proBNP plasma concentrations should be considered to gain prognostic information.[121,125,126]	IIa	B
The measurement of additional biomarkers, such as mid-regional pro-A-type natriuretic peptide, high-sensitivity C-reactive protein, mid-regional pro-adrenomedullin, GDF-15, copeptin, and h-FABP is not recommended for routine risk or prognosis assessment.[50,127,129]	III	B
Score to risk stratify in NSTE-ACS		
GRACE risk score models should be considered for estimating prognosis.[137–139]	IIa	B
The use of risk scores designed to evaluate the benefits and risks of different DAPT durations may be considered.[153,154]	IIb	A
To estimate bleeding risk, the use of scores may be considered in patients undergoing coronary angiography.[155,156]	IIb	B

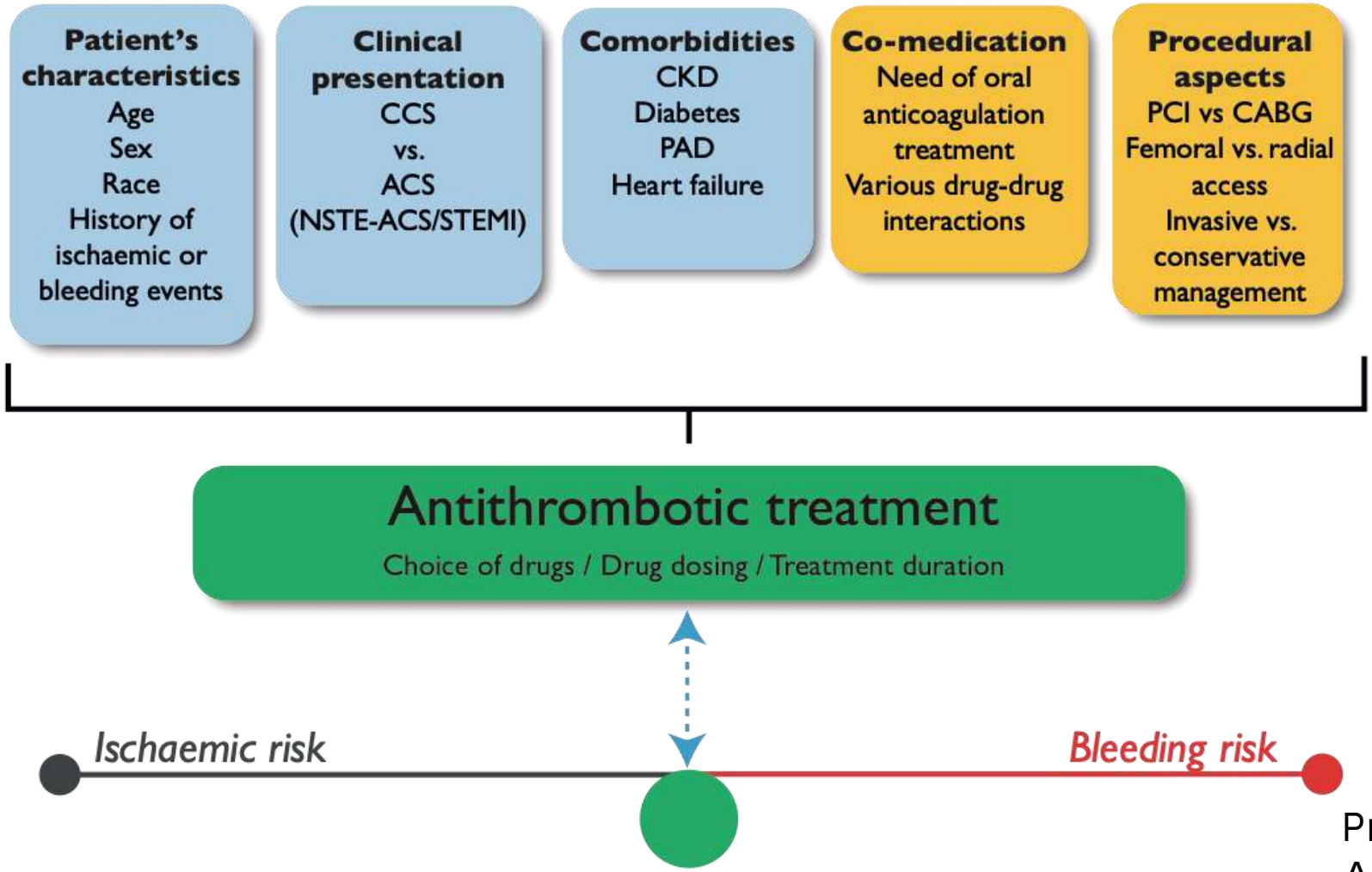
GRACE Risk Score

Probability of In Hospital Death

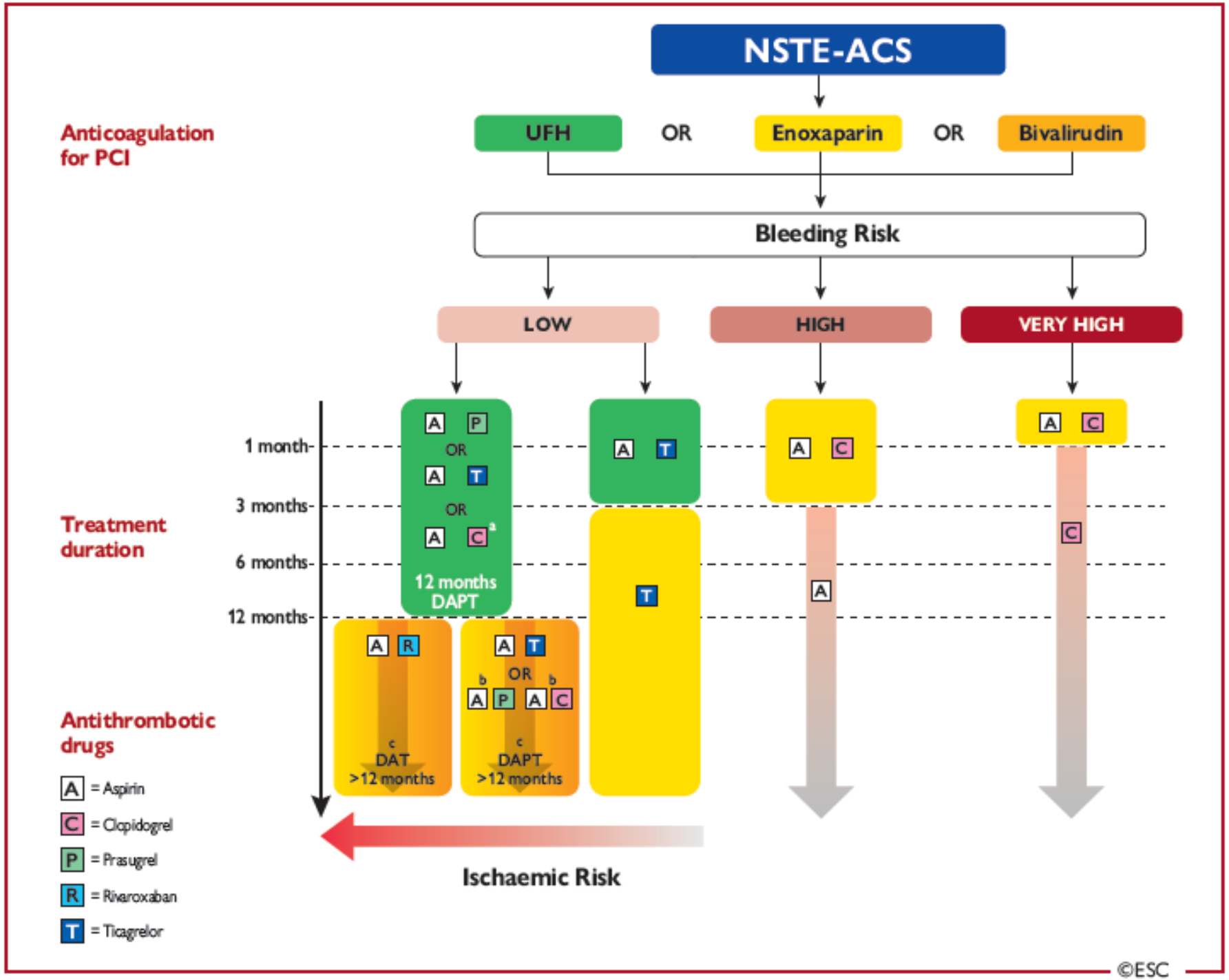
Background		Findings at time of admission		Findings during hospital stay	
① Age, y	Points	④ HR at admission, bpm	Points	⑦ Serum creatinine at admission, mg/dL	Points
≤ 29	0	≤ 49.9	0	0-0.39	1
30-39	0	50-69.9	3	0.4-0.79	3
40-49	18	70-89.9	9	0.8-1.19	5
50-59	36	90-109.9	14	1.2-1.59	7
60-69	55	110-149.9	23	1.6-1.99	9
70-79	73	150-199.9	35	2-3.99	15
80-89	91	≥ 200	43	≥ 4	20
≥ 90	100	⑤ SAP at admission, mmHg		⑧ Elevated enzymes or markers	15
② History of heart failure	24	≤ 79.9	24	⑨ No percutaneous revascularisation	14
③ History of AMI	12	80-99.9	22		
		100-119.9	18		
		120-139.9	14		
		140-159.9	10		
		160-199.9	4		
		≥ 200	0		
		⑥ Depressed ST segment	11		

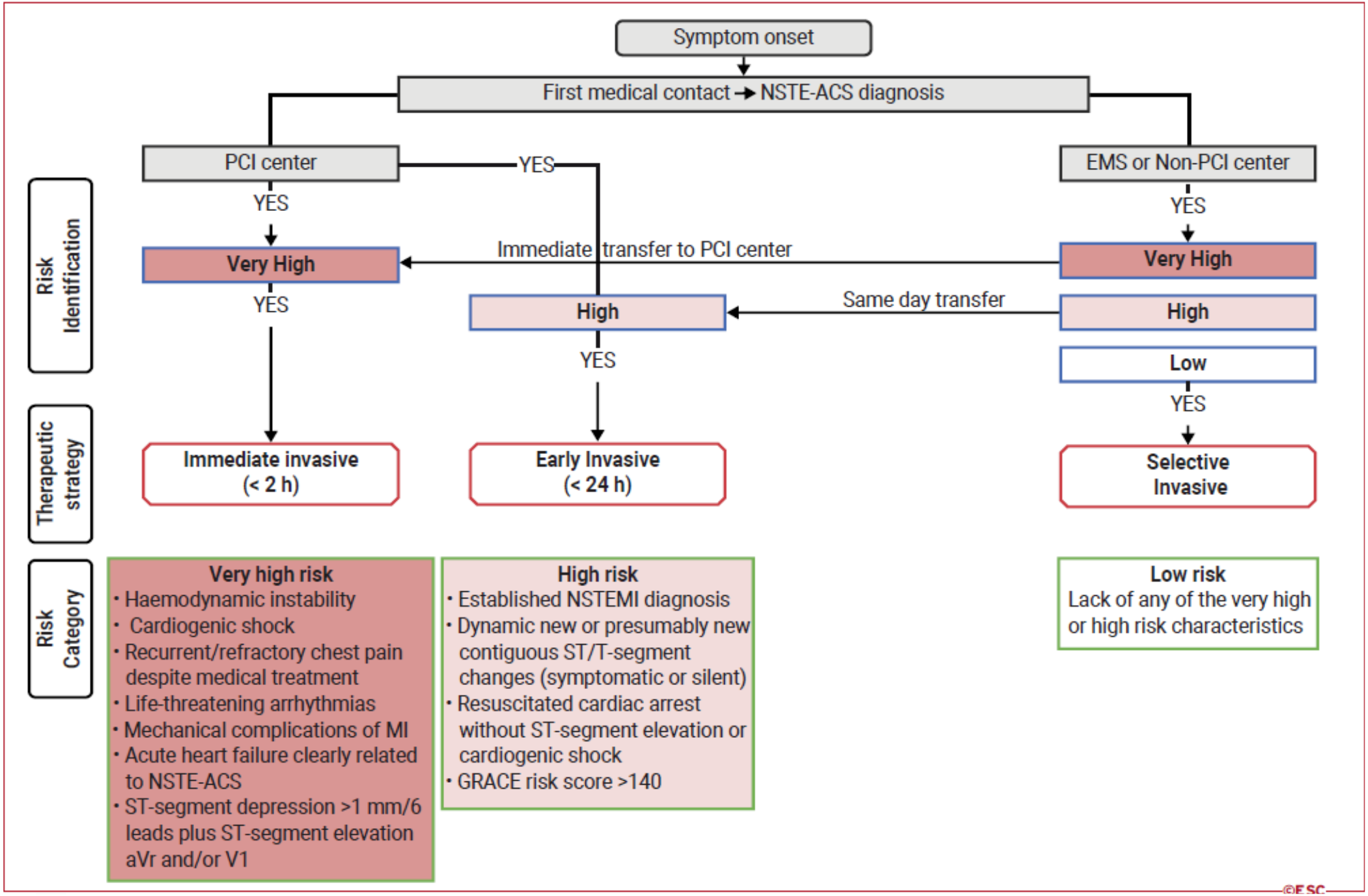


Balancing Clinical Risk and Bleeding Risk:-

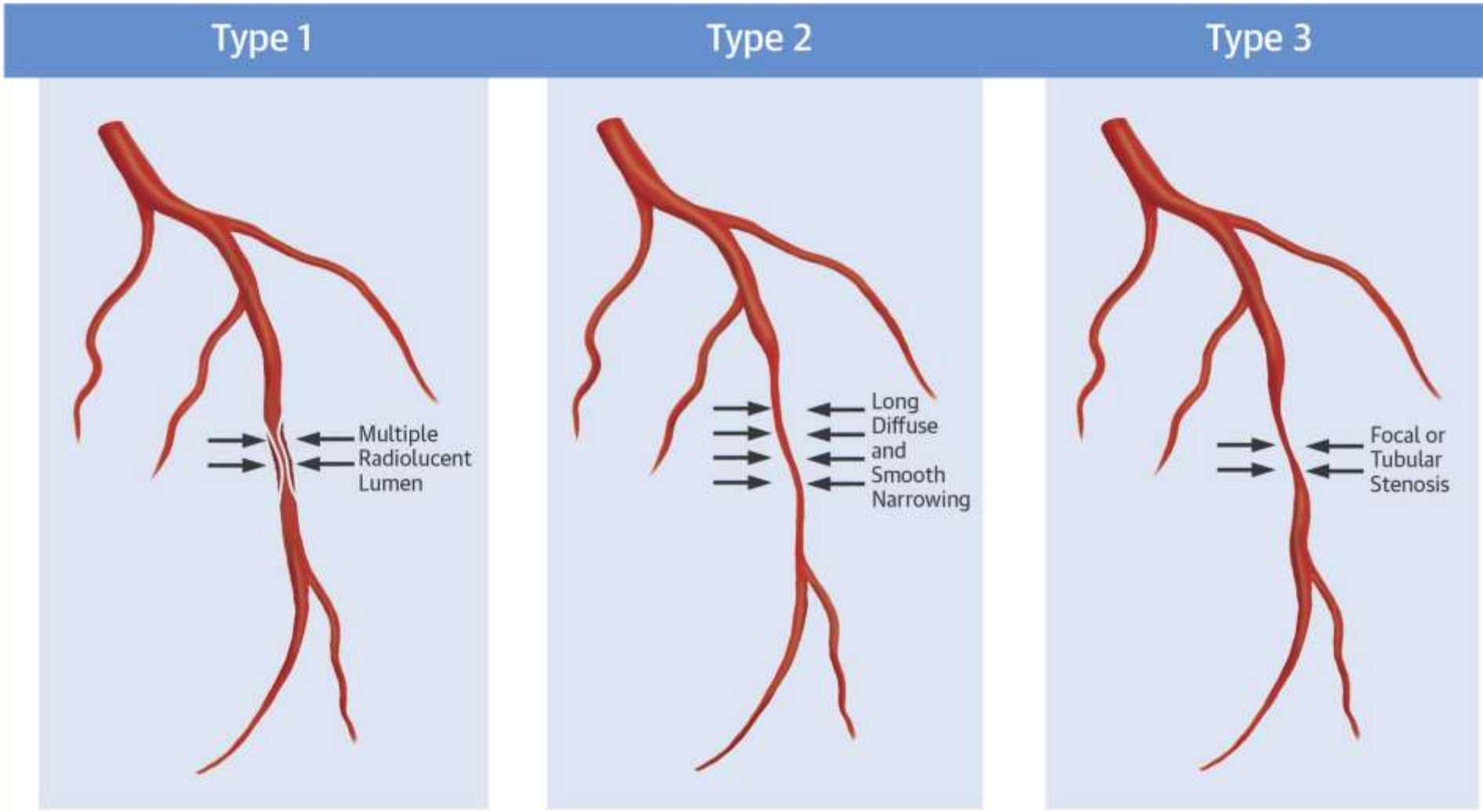


Precise DAPT
ARC- HBR criteria


NSTE-ACS
Anticoagulation for PCI
UFH
OR
Enoxaparin
OR
Bivalirudin
Bleeding Risk
LOW
HIGH
VERY HIGH
Treatment duration
1 month
3 months
6 months
12 months
A P
OR
A T
OR
A C a
12 months DAPT
A T
A C
A C
A R
c DAT >12 months
A T
OR
b A P A C b
c DAPT >12 months
T
A
C
Antithrombotic drugs
A = Aspirin
C = Clopidogrel
P = Prasugrel
R = Rivaroxaban
T = Ticagrelor
Ischaemic Risk
©ESC

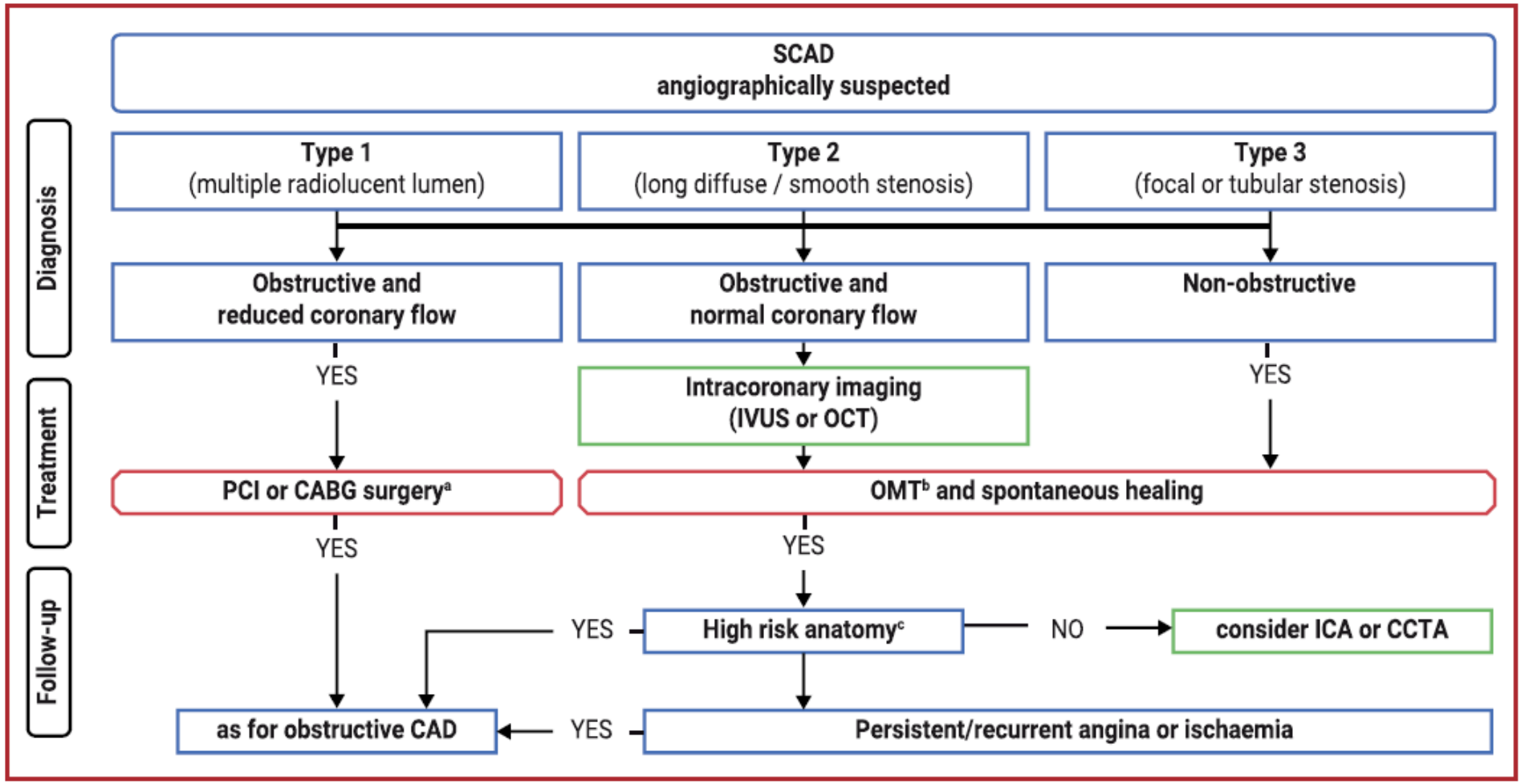

Symptom onset
First medical contact → NSTE-ACS diagnosis
PCI center
EMS or Non-PCI center
YES
YES
YES
Immediate transfer to PCI center
Same day transfer
Very High
High
Low
Very High
High
Risk Identification
Therapeutic strategy
Risk Category
Immediate invasive (< 2 h)
Early Invasive (< 24 h)
Selective Invasive
Very high risk
• Haemodynamic instability
• Cardiogenic shock
• Recurrent/refractory chest pain despite medical treatment
• Life-threatening arrhythmias
• Mechanical complications of MI
• Acute heart failure clearly related to NSTE-ACS
• ST-segment depression >1 mm/6 leads plus ST-segment elevation aVr and/or V1
High risk
• Established NSTEMI diagnosis
• Dynamic new or presumably new contiguous ST/T-segment changes (symptomatic or silent)
• Resuscitated cardiac arrest without ST-segment elevation or cardiogenic shock
• GRACE risk score >140
Low risk
Lack of any of the very high or high risk characteristics
©ESC

CENTRAL ILLUSTRATION: SCAD Classification



Saw, J. et al. J Am Coll Cardiol. 2017;70(9):1148-58.

Figure 11 Diagnosis & treatment of patients with non-ST-segment elevation acute coronary syndrome related to spontaneous coronary artery dissection.



[a]Selection of revascularization strategy for high-risk anatomy according to local expertise. [b]Beta-blocker recommended while benefit of DAPT is questionable. cLeft main or proximal left anterior descendent or circumflex or right coronary artery, multivessel SCAD.

2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation (European Heart Journal 2020 - doi/10.1093/eurheartj/ehaa575)

The diagnosis of MINOCA is made in patients with AMI fulfilling the following criteria:

1. AMI (modified from the 'Fourth Universal Definition of Myocardial Infarction' criteria):

- Detection of a rise or fall in cardiac troponin with at least one value above the 99th percentile upper reference limit and
- Corroborative clinical evidence of infarction as shown by at least one of the following:
  a. Symptoms of myocardial ischaemia
  b. New ischaemic electrocardiographic changes
  c. Development of pathological Q waves
  d. Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic cause
  e. Identification of a coronary thrombus by angiography or autopsy

2. Non-obstructive coronary arteries on angiography:

- Defined as the absence of obstructive disease on angiography (i.e. no coronary artery stenosis ≥50%) in any major epicardial vessel[a]

This includes patients with:

- Normal coronary arteries (no angiographic stenosis)
- Mild luminal irregularities (angiographic stenosis <30% stenoses)
- Moderate coronary atherosclerotic lesions (stenoses >30% but <50%)

3. No specific alternate diagnosis for the clinical presentation:

- Alternate diagnoses include, but are not limited to, non-ischaemic causes such as sepsis, pulmonary embolism, and myocarditis

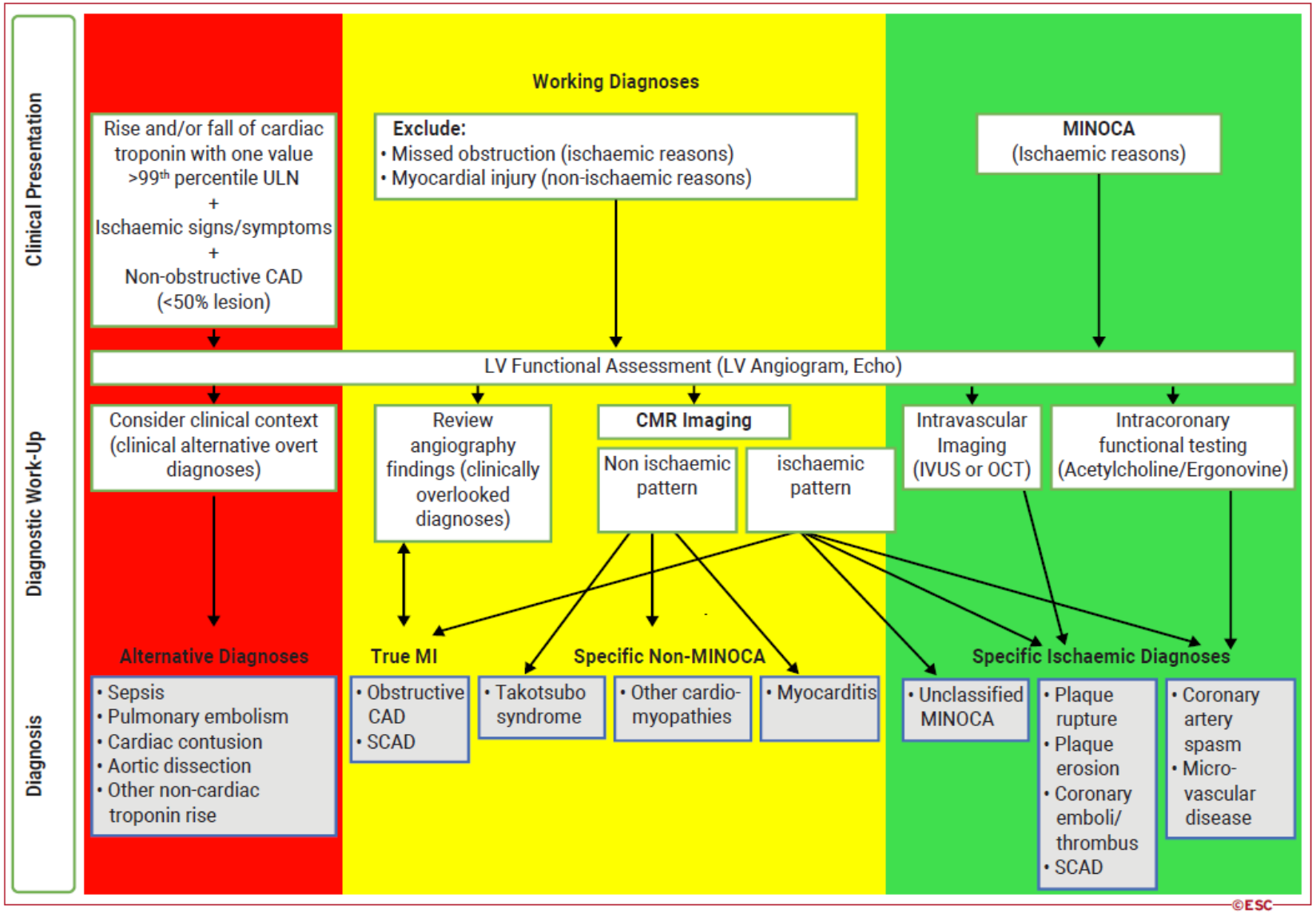
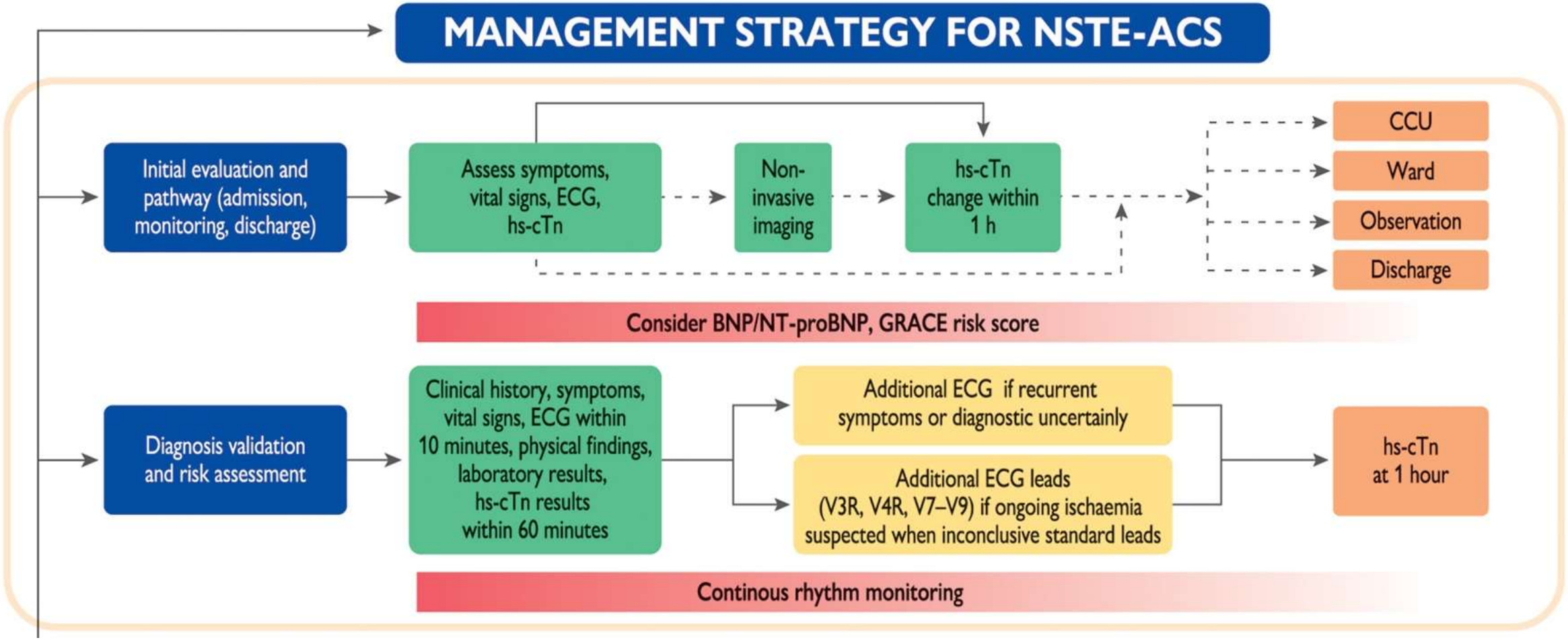


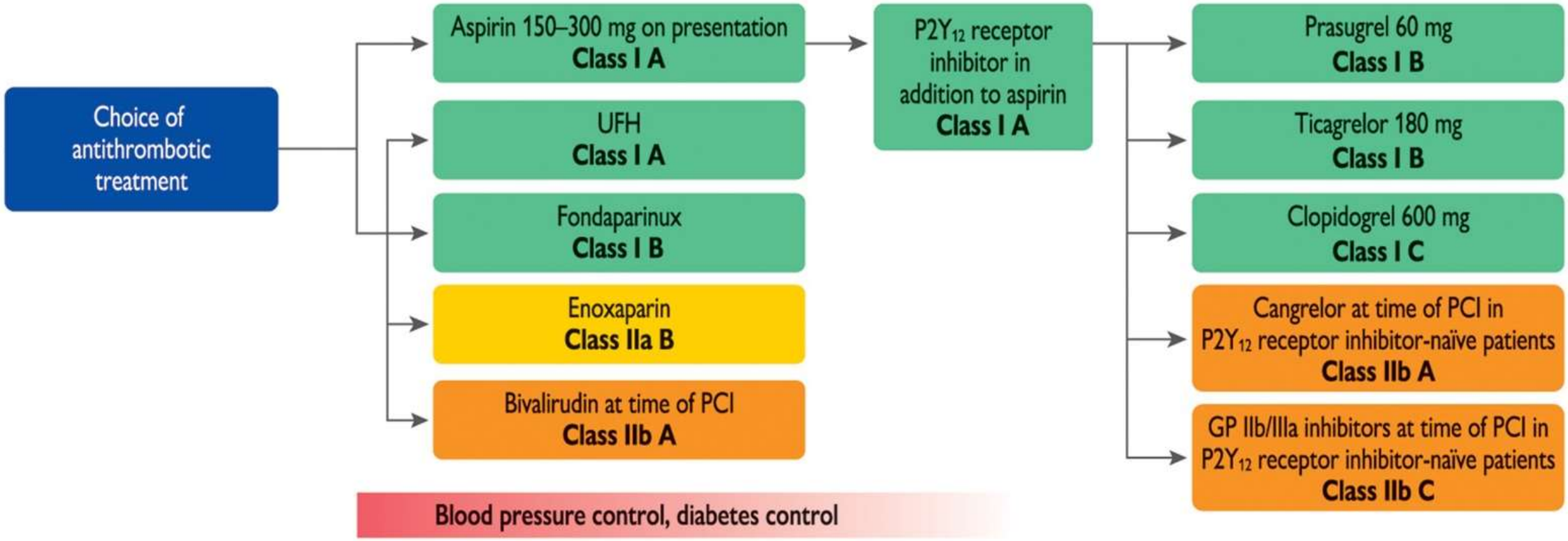
Figure 12 Diagnostic algorithm for myocardial infarction with non-obstructive coronary arteries using a traffic light scheme.

2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation (European Heart Journal 2020 - doi/10.1093/eurheartj/ehaa575)

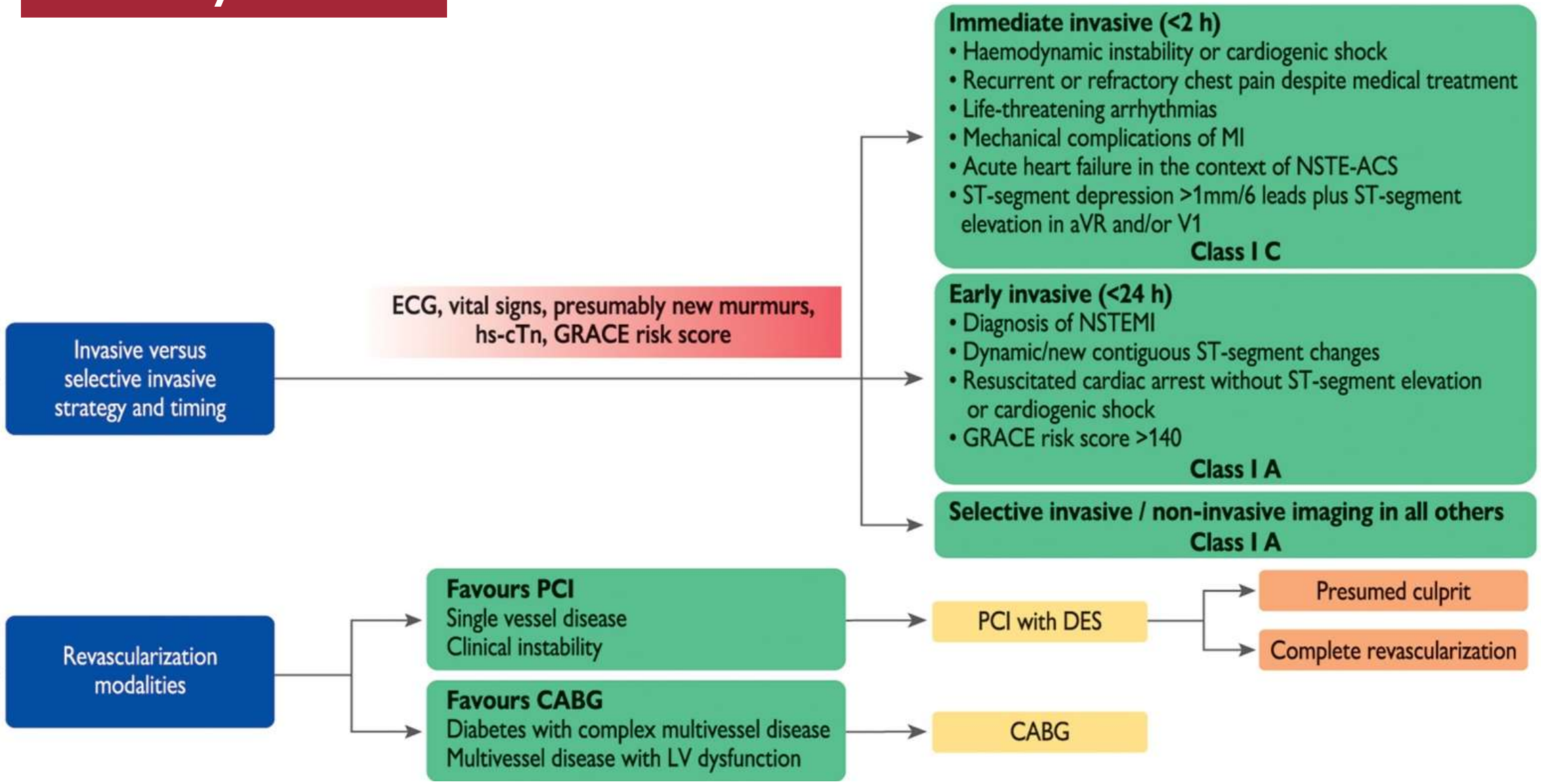
Summary STEP 1



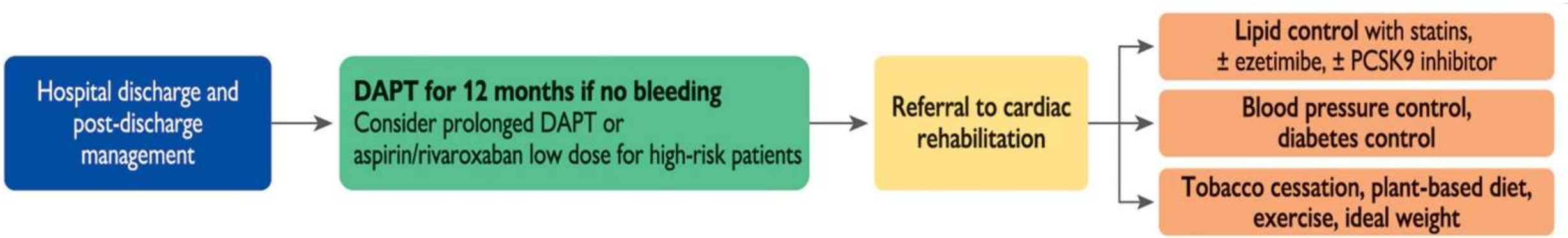
Summary STEP 2



Summary STEP 3



Summary STEP 4




Thank you