FAKULTNÍ NEMOCNICE® OLOMOUC

Lékařská fakulta

Univerzita Palackého v Olomouci

Guidelines AKS 2023
- diagnostika a prehospitalizační péče

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ESC GUIDELINES

2023 ESC Guidelines for the management of acute coronary syndromes

Developed by the task force on the management of acute coronary syndromes of the European Society of Cardiology (ESC)

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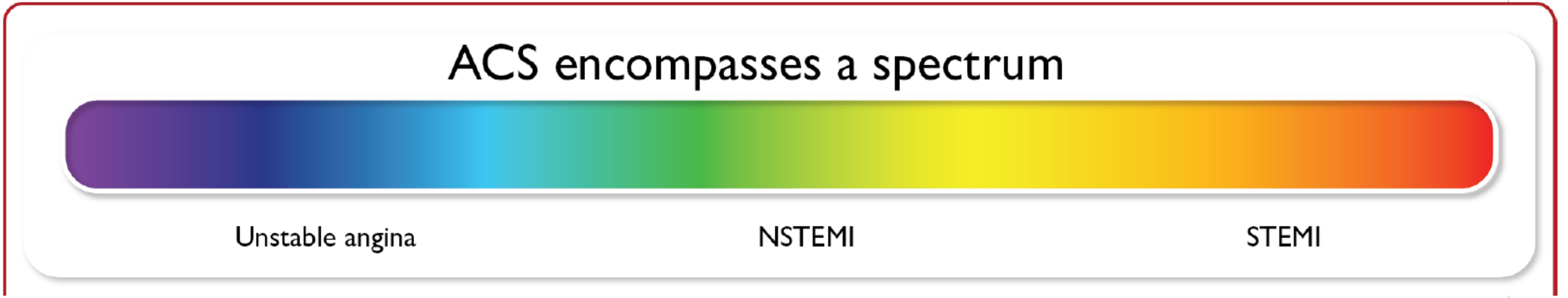
*European Heart Journal (2023) **44**, 3720–3826*

2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation

2023 ESC Guidelines for the management of acute coronary syndromes



Diagnostic tests, *invasive management*, hospital care, long-term management,...

2023 ESC Guidelines for the management of acute coronary syndromes
(European Heart Journal; 2023 – doi:10.1093/eurheartj/ehad191)

Why did we combine STEMI, NSTEMI and UA?

"..after the acute management and stabilization phase, **most aspects of the subsequent management strategy are common to all patients with ACS** (regardless of the initial ECG pattern or the presence/absence of cardiac troponin elevation at presentation) **and can therefore be considered under a common pathway."**

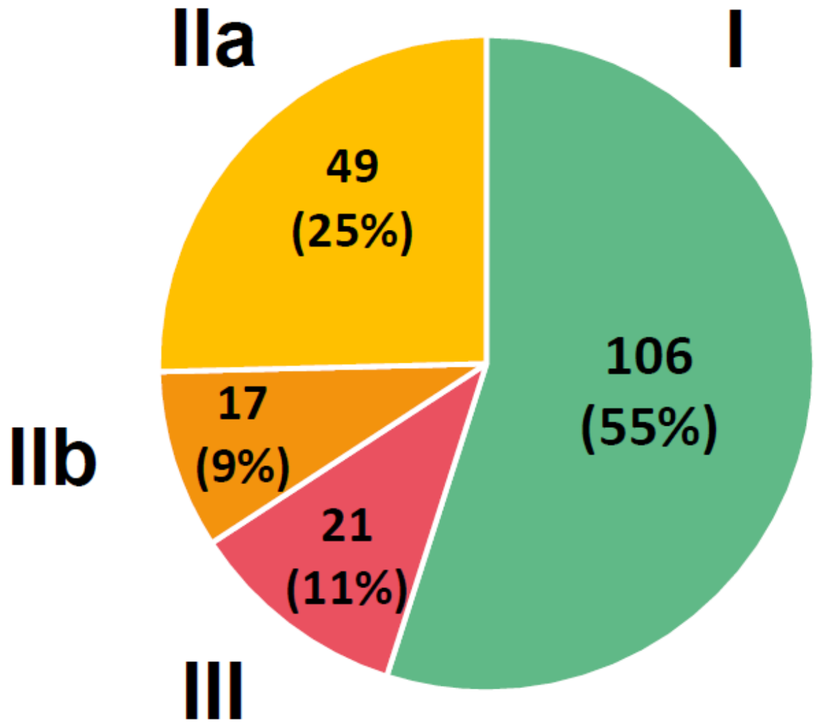
ACS should be considered a **spectrum**, which encompasses
both **NSTE-ACS and STEMI**

2023 ESC Guidelines for the management of acute coronary syndromes
(European Heart Journal; 2023 – doi:10.1093/eurheartj/ehad191)

ESC Classes of Recommendations

Classes of recommendations	Definition	Wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended or is indicated
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered
Class IIb	Usefulness/efficacy is less well established by evidence/opinion.	May be considered
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended

193 Recommendations 936 References



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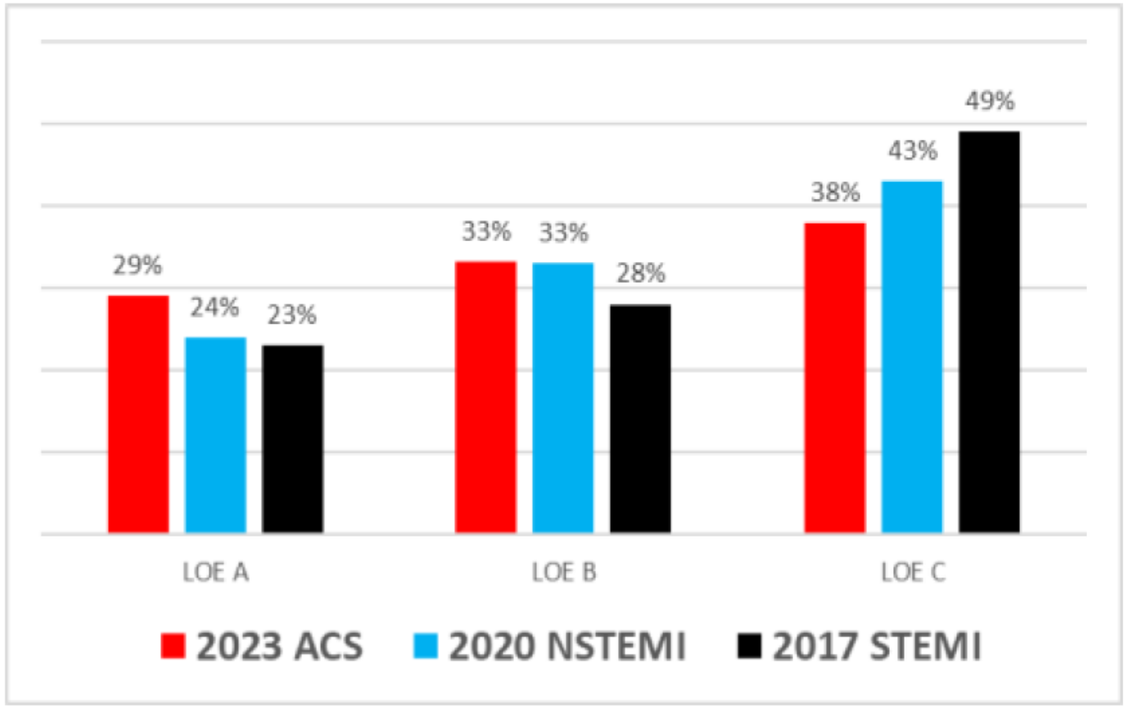
ESC Levels of Evidence



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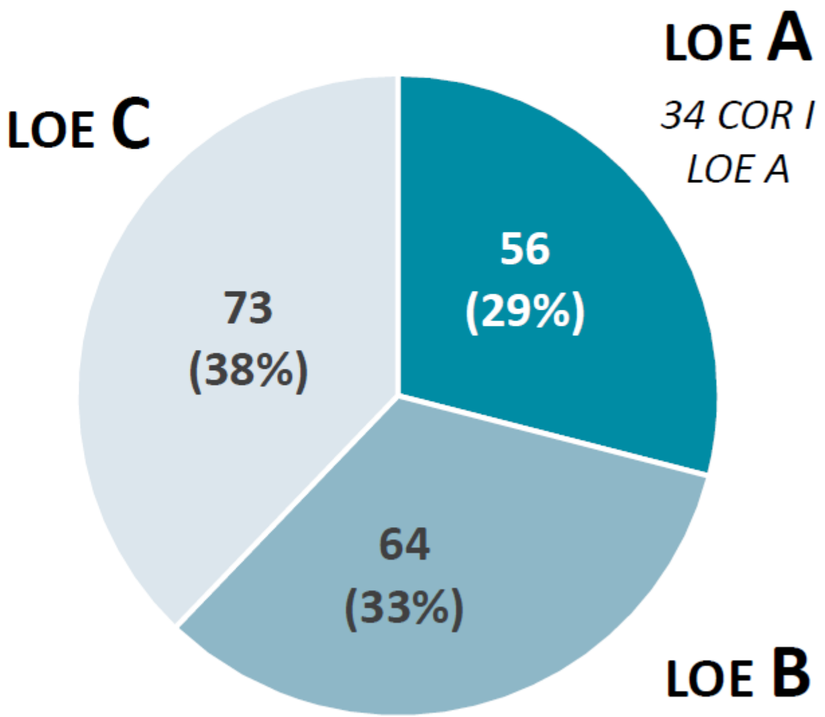

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The ACS spectrum

Clinical presentation	Oligo/ asymptomatic	Increasing chest pain/symptoms	Persistent chest pain/symptoms	Cardiogenic shock/ acute heart failure	Cardiac arrest
ECG findings	Normal	ST segment depression	ST segment elevation	Malignant arrhythmia	
Working diagnosis	NSTE-ACS			STEMI	
hs-cTn levels	Non-elevated			Rise and fall	
Final diagnosis	Unstable angina		NSTEMI	STEMI	

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ACS presentation

Initial A.C.S. assessment

ECG | Physical examination | Clinical history | Vital signs | hs-cTn[a] levels

Working diagnosis

STEMI	NSTE-ACS with very high-risk features[b]	NSTE-ACS without very high-risk features[b]
Immediate angiography ± PPCI or fibrinolysis if timely PPCI not feasible	Immediate angiography ± PCI	Consider angiography within 24 h for NSTE-ACS with high risk features

Early invasive angiography according to patient risk

STEMI	NSTE-ACS with very high-risk features[b]	NSTE-ACS without very high-risk features[b]
PPCI, ATT, Fibrinolysis	PCI, ATT	PCI, ATT

Further investigations

Non-immediate angiography | Echo | Intravascular imaging | Non-invasive imaging | hs-cTn[a] levels | ECG monitoring

Further management

PCI | CABG | Long-term medical therapy | Lifestyle measures | Smoking cessation

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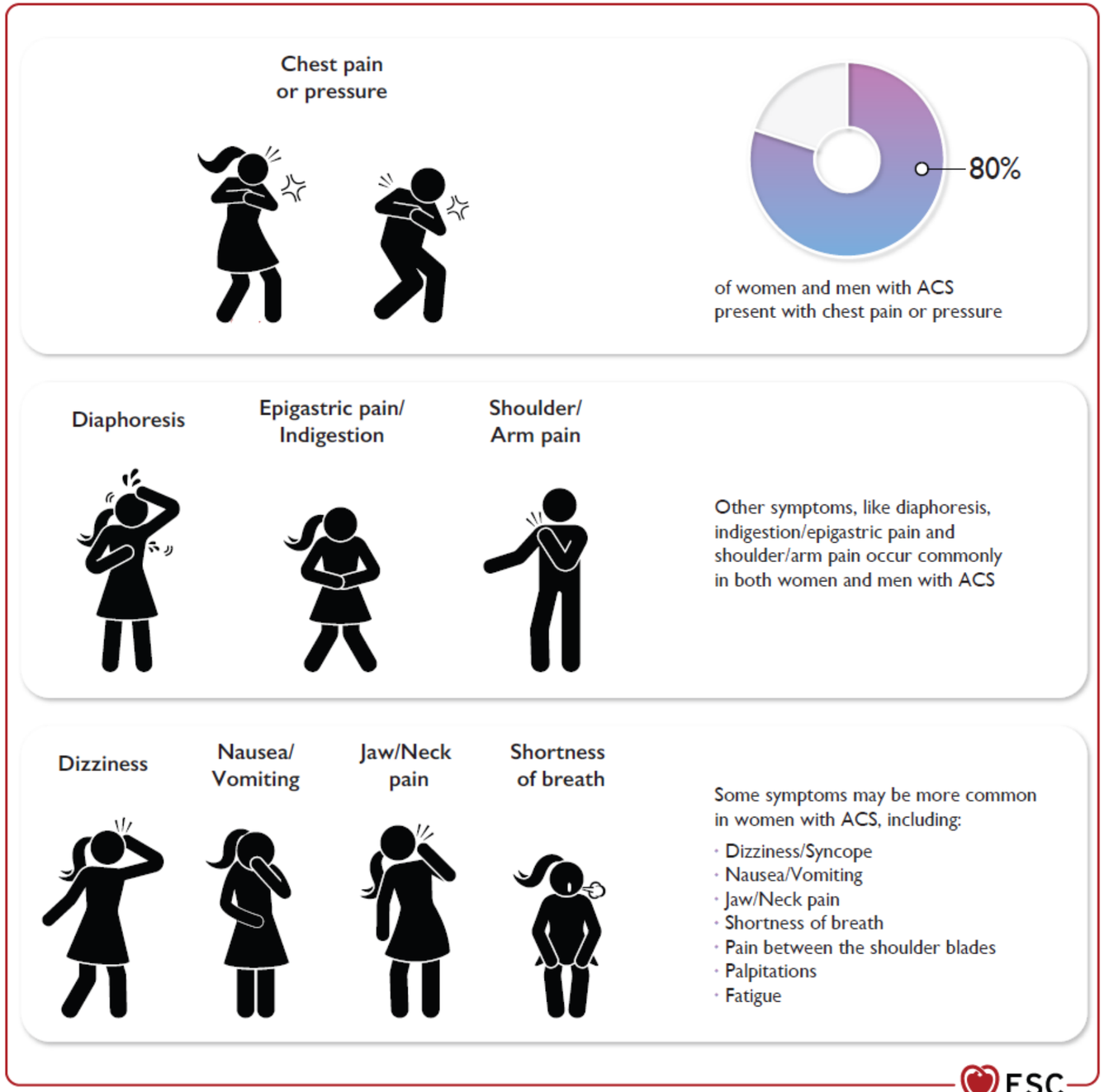
Klinická prezentace

- **Chest pain** descriptors should be classified as:
  - cardiac
  - possibly cardiac
  - likely non-cardiac.
- The use of the descriptor **‘atypical’ should be avoided.**

- **Chest pain-equivalent symptoms:**
  - dyspnoea
  - epigastric pain
  - pain in the left or right arm or neck/jaw.



Recommendations for clinical and diagnostic tools for patients with suspected acute coronary syndrome (1)

Recommendations	Class	Level
It is recommended to base the diagnosis and initial short-term risk stratification of ACS on a combination of clinical history, symptoms, vital signs, other physical findings, ECG, and hs-cTn.	I	B
ECG		
Twelve-lead ECG recording and interpretation is recommended as soon as possible at the point of FMC, with a target of <10 min.	I	B
Continuous ECG monitoring and the availability of defibrillator capacity is recommended as soon as possible in all patients with suspected STEMI, in suspected ACS with other ECG changes or ongoing chest pain, and once the diagnosis of MI is made.	I	B
The use of additional ECG leads (V3R, V4R, and V7–V9) is recommended in cases of inferior STEMI or if total vessel occlusion is suspected and standard leads are inconclusive.	I	B
An additional 12-lead ECG is recommended in cases with recurrent symptoms or diagnostic uncertainty.	I	C

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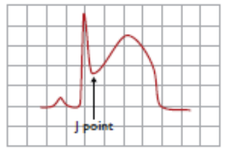
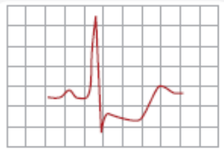
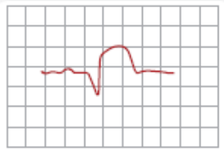
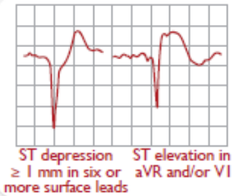
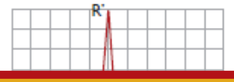
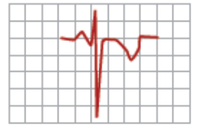
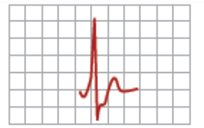
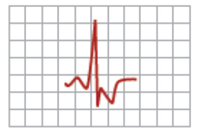
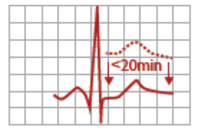
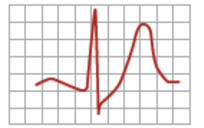
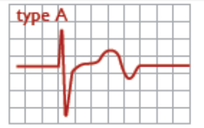
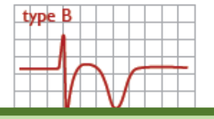
ECG pattern	Criteria	Signifying	Figure
i STEMI	New ST-elevation at the J-point in ≥ 2 contiguous leads[a] ≥2.5 mm in men <40 years, ≥2 mm in men ≥40 years, or ≥1.5 mm in women regardless of age in leads V2–V3 and/or ≥1 mm in the other leads (in the absence of LV hypertrophy or left bundle branch block) [a]Including V3R and V4R	Ongoing acute coronary artery occlusion	
ii Posterior STEMI	ST-segment depression in leads V1–V3, especially when the terminal T-wave is positive (ST-segment elevation equivalent), and concomitant ST-segment elevation ≥0.5 mm recorded in leads V7–V9	Posterior STEMI	
iii LCx occlusion/ right ventricular MI	ST-segment elevation in V7–V9 and V3R and V4R, respectively	Left circumflex (LCX) artery occlusion or right ventricular MI	
iv Multivessel ischaemia/ left main obstruction	ST depression ≥1mm in six or more surface leads (inferolateral ST depression), coupled with ST-segment elevation in aVR and/or V1	Multivessel ischaemia or left main coronary artery obstruction, particularly if the patient presents with haemodynamic compromise	
v Left bundle branch block/ paced rhythm	QRS duration greater than 120 ms Absence of Q wave in leads I, V5 and V6 Monomorphic R wave in I, V5 and V6 ST and T wave displacement opposite to the major deflection of the QRS complex	Patients with a high clinical suspicion of ongoing myocardial ischaemia should be managed in a similar way to STEMI patients	
vi	QRS duration greater than 120 ms rsR' "bunny ear" pattern in the anterior precordial leads	Patients with a high clinical suspicion of ongoing myocardial ischaemia	

Electrocardiographic abnormalities in patients with STEMI and ECG findings that, if present, may prompt triage for immediate reperfusion therapy.

ECG pattern	Criteria	Signifying	Figure
a Isolated T-wave inversion	T-wave inversion >1 mm in ≥5 leads including I, II, aVL, and V2–V6	Only mildly impaired prognosis	
b 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	 
c Transient ST-segment elevation	ST segment elevation in ≥2 contiguous leads of ≥2.5 mm in men <40 years, ≥2 mm in men ≥ 40 years, or ≥1.5 mm in women regardless of age in leads V2–V3 and/or ≥1 mm in the other leads lasting <20 min	**Only mildly impaired prognosis**	
d 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	
e 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	 

Electrocardiographic abnormalities in patients with non-ST-segment elevation acute coronary syndrome

STEMI pathway:

No changes

FMC location & 120 min rule

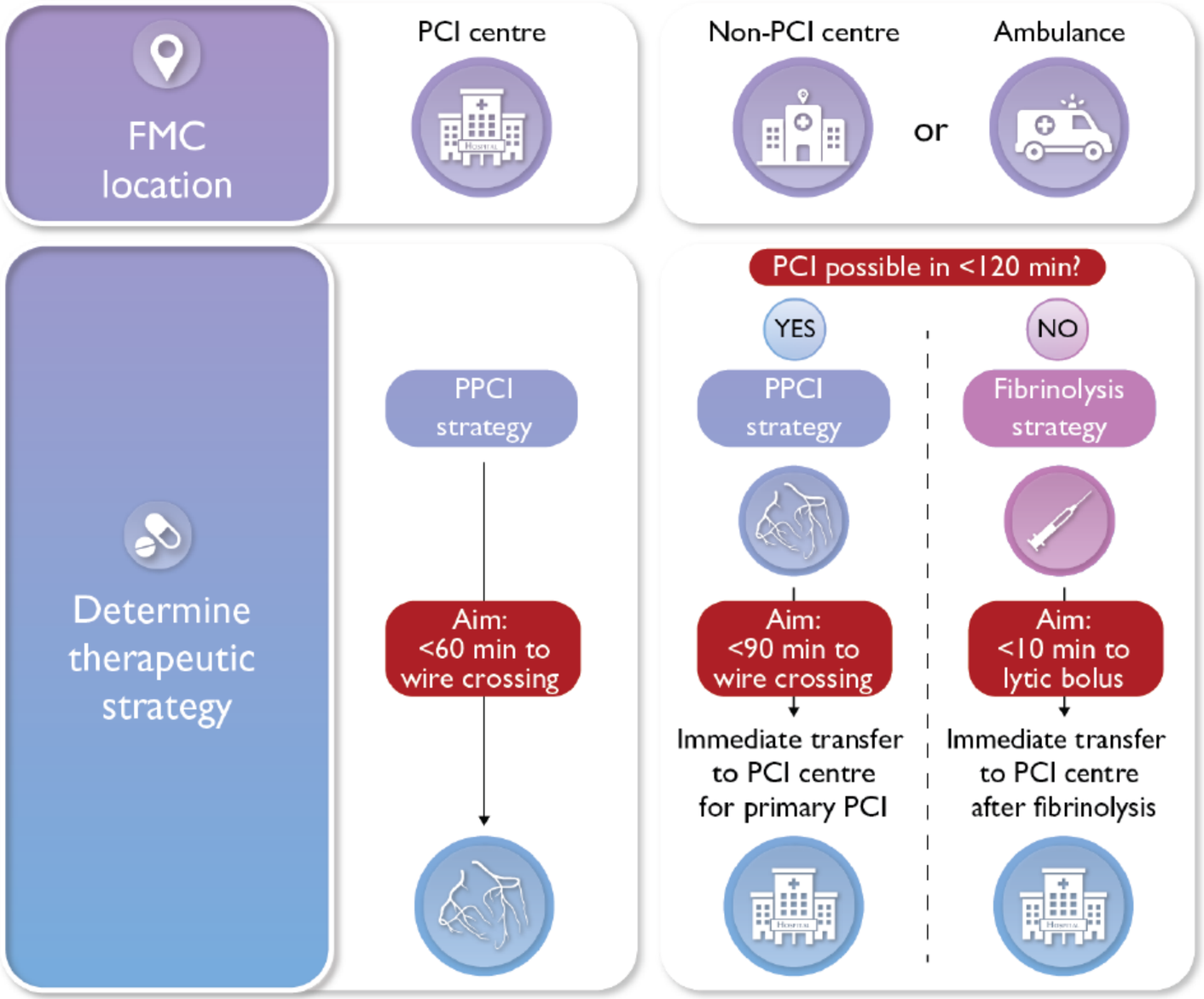


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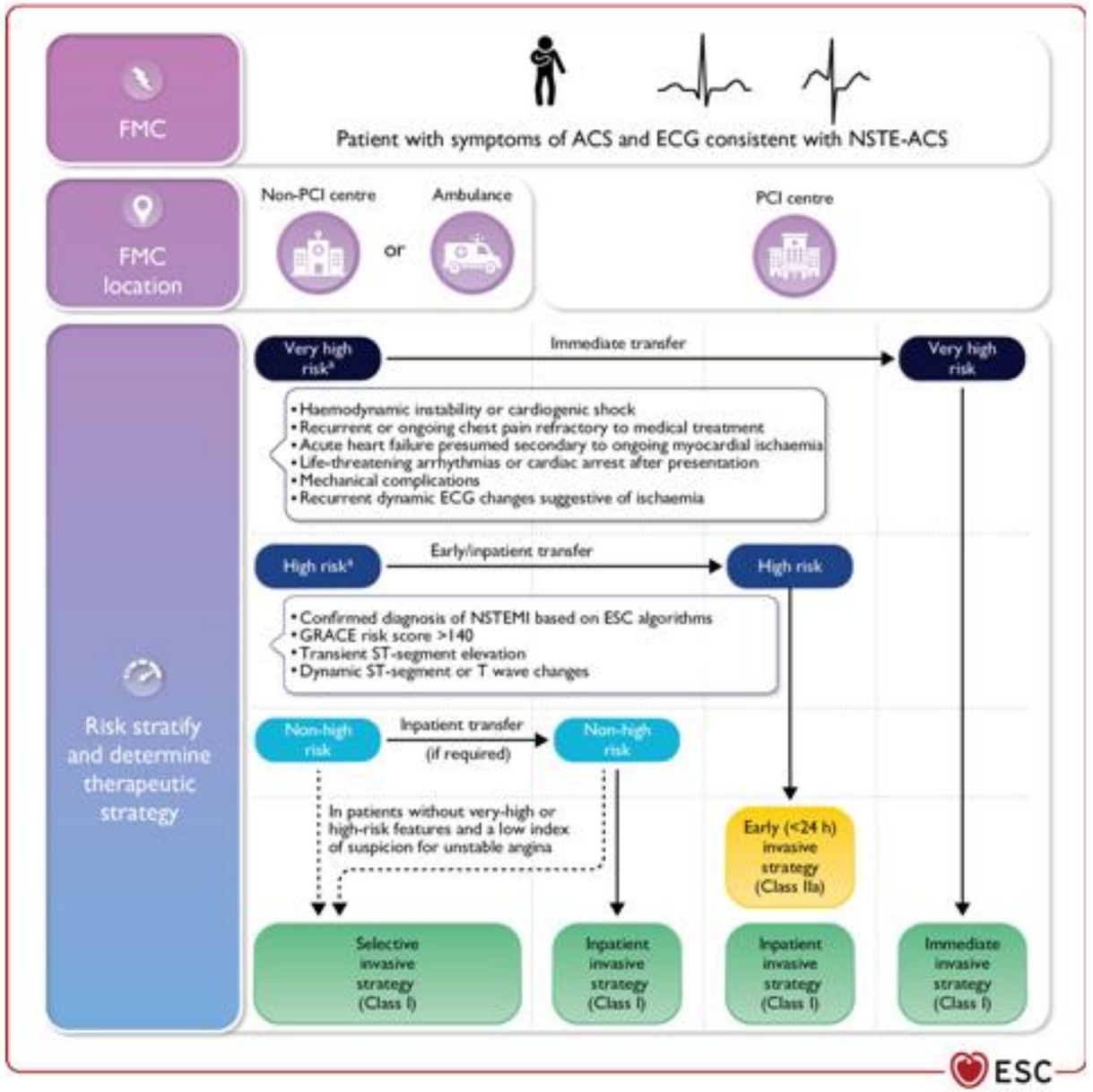
Figure 8

Selection of invasive strategy and reperfusion therapy in patients presenting with NSTE-ACS



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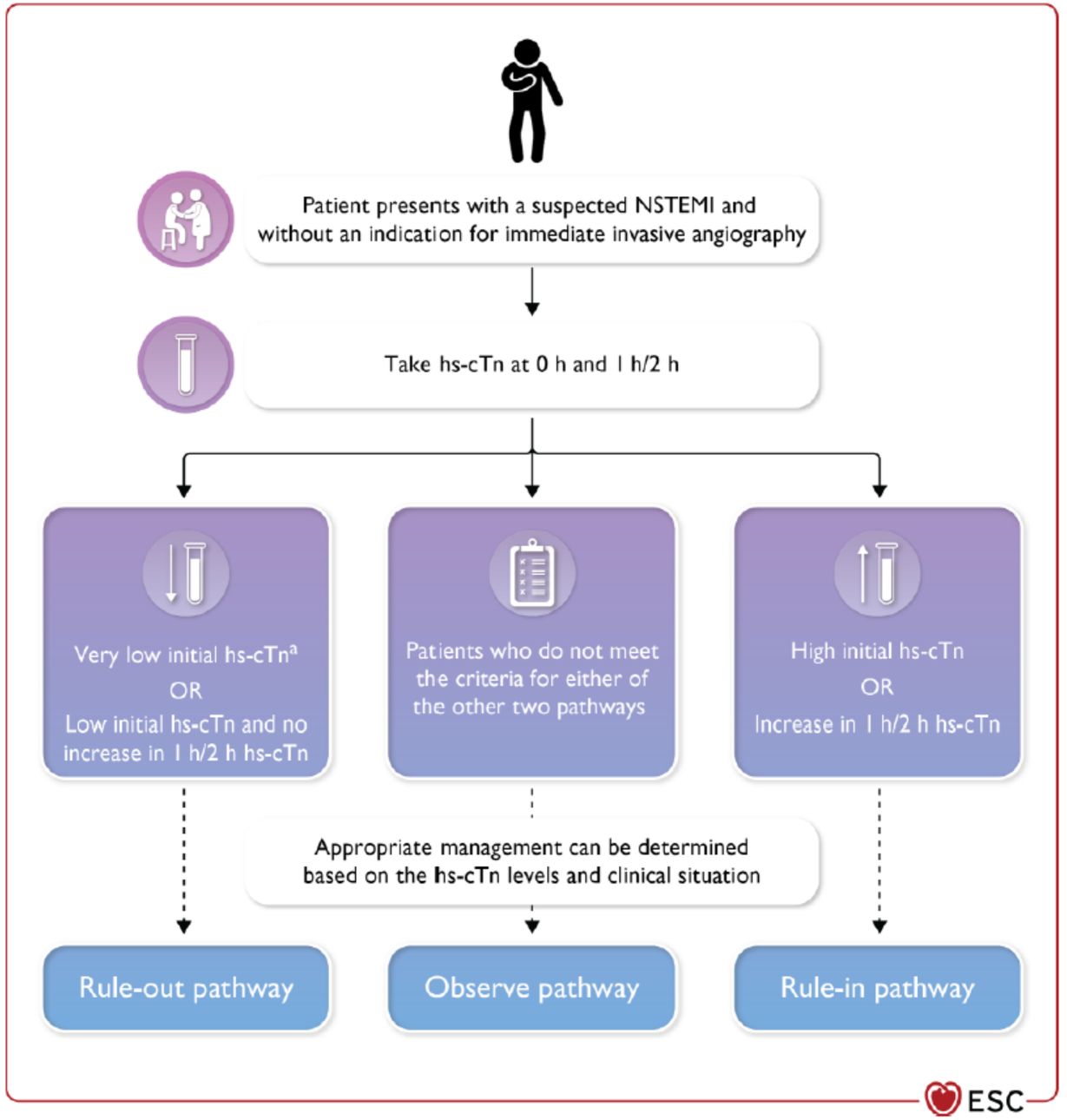
ESC 0h/1h or 0h/2h hs-cTn rule-out /in NSTEMI algorithms remain central



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High-sensitivity troponin testing

Recommendations	Class	Level
Blood sampling		
It is recommended to measure **cardiac troponins with high-sensitivity assays** immediately after **presentation** and to obtain the results within 60 min of blood sampling.	I	B
It is recommended to use an **ESC algorithmic** approach with serial hs-cTn measurements (**0 h/1 h or 0 h/2 h**) to rule in and rule out NSTEMI.	I	B
Additional testing after 3 h is recommended if the first two hs-cTn measurements of the 0 h/1 h algorithm are [illegible] explaining the condition have been m[illegible]	I	B
The use of established risk scores (e.g. GRACE risk score) for prognosis estimation should be considered	IIa	B

"0/1h ESC algorithm first option
0/2h ESC algorithm second best
0/3h ESC algorithm exclusively for cases where the others not available"

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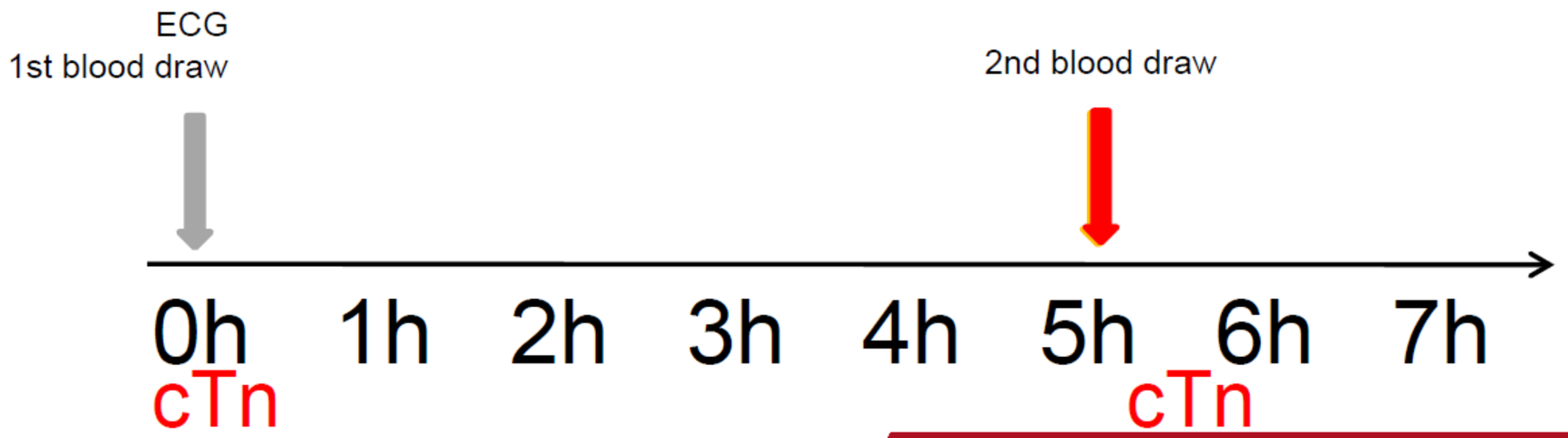
Troponin and ESC Guidelines Over the Time



3-h Algorithm: hs-cTn hs-cTn
(ESC 2011)

0/1-h Algorithm: hs-cTn hs-cTn
(ESC 2015)

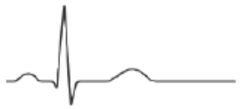
0/1-h Algorithm: hs-cTn hs-cTn hs-cTn*
0/2-h Algorithm*
(ESC 2020)
(ESC 2023)

"**ESC 0 h/3 h** algorithm appears to balance efficacy and safety **less well than** more rapid protocols using lower rule-out concentrations, including the **ESC 0 h/1 h algorithm**"

Hamm C. et al. Eur Heart J. 2011:32:2999-3054. Roffi M. et al. Eur Heart J. 2016:37:267-315. Collet J. et al. Eur Heart J.

Practical guidance when using hs-cTn ESC algorithms

Only in patients presenting with **suspected ACS**

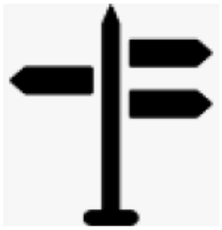


Always in conjunction with **ECG and clinic**

Assay-specific and can be used only for the suggested assays

Time to decision = time of blood draw + turnaround time

If clinical suspicion or very early presenters triaged towards rule-out **3h additional sample** should be considered



TRIAGE ALGORITHMS

- **Rule-out:** alternative diagnosis to MI should be identified
- **Observe:** 3h sampling and additional tests
- **Rule-in:** establish an accurate final diagnosis (other reasons for hs-cTn elevation?)

Table S4 **Assay specific cut-off levels in ng/L within the 0 h/1 h and 0 h/2 h algorithms**

0 h/1 h algorithm	Very low	Low	No 1 hΔ	High	1 hΔ
hs-cTnT (Elecsys; Roche)	<5	<12	<3	≥52	≥5
hs-cTnI (Architect; Abbott)	<4	<5	<2	≥64	≥6
hs-cTnI (Centaur; Siemens)	<3	<6	<3	≥120	≥12
hs-cTnI (Access; Beckman Coulter)	<4	<5	<4	≥50	≥15
hs-cTnI (Clarity; Singulex)	<1	<2	<1	≥30	≥6
hs-cTnI (Vitros; Clinical Diagnostics)	<1	<2	<1	≥40	≥4
hs-cTnI (Pathfast; LSI Medience)	<3	<4	<3	≥90	≥20
hs-cTnI (TriageTrue; Quidel)	<4	<5	<3	≥60	≥8
hs-cTnI (Dimension EXL; Siemens)	<9	<9	<5	≥160	≥100
0 h/2 h algorithm	**Very low**	**Low**	**No 2 hΔ**	**High**	**2 hΔ**
hs-cTnT (Elecsys; Roche)	<5	<14	<4	≥52	≥10
hs-cTnI (Architect; Abbott)	<4	<6	<2	≥64	≥15
hs-cTnI (Centaur; Siemens)	<3	<8	<7	≥120	≥20
hs-cTnI (Access; Beckman Coulter)	<4	<5	<5	≥50	≥20
hs-cTnI (Clarity; Singulex)	<1	TBD	TBD	≥30	TBD
hs-cTnI (Vitros; Clinical Diagnostics)	<1	TBD	TBD	≥40	TBD
hs-cTnI (Pathfast; LSI Medience)	<3	TBD	TBD	≥90	TBD
hs-cTnI (TriageTrue; Quidel)	<4	TBD	TBD	≥60	TBD

The cut-offs apply irrespective of age, sex, and renal function. Optimized cut-offs for patients above 75 years of age and patients with renal dysfunction have been evaluated, but not consistently shown to provide better balance between safety and efficacy as compared with these universal cut-offs.[30,31] The algorithms for additional assays are in development: hs-cTn T on Elecsys (Roche), hs-cTn I on Architect (Abbott), hs-cTn I on Centaur (Siemens), hs-cTn I on Access (Beckman Coulter), hs-cTn I on Clarity (Singulex), hs-cTn I on Vitros (Clinical Diagnostics), hs-cTn I on Pathfast (LSI Medience), and hs-cTn I on TriageTrue (Quidel).
hs-cTn, high-sensitivity cardiac troponin; TBD, to be determined.[30,31,67–88]

Recommendations for non-invasive imaging in the initial assessment of patients with suspected acute coronary syndrome

Recommendations	Class	Level
Emergency TTE is recommended in patients with suspected ACS presenting with **cardiogenic shock or suspected mechanical complications**.	I	C
In patients with suspected ACS, non-elevated (or uncertain) hs-cTn levels, no ECG changes and no recurrence of pain, incorporating CCTA or a non-invasive stress imaging test as part of the initial workup should be considered.	IIa	A
Emergency TTE should be considered **at triage in cases of diagnostic uncertainty** but this **should not result in delays** in transfer to the cardiac catheterization laboratory if there is suspicion of an acute coronary artery occlusion.	IIa	C
Routine, early CCTA in patients with suspected ACS is not recommended.	III	B

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Recommendations for the initial management of patients with acute coronary syndrome (1)

Recommendations	Class	Level
Hypoxia		
Oxygen is recommended in patients with hypoxaemia (SaO_2 <90%).	I	C
Routine oxygen is not recommended in patients without hypoxaemia (SaO_2 >90%).	III	A
Symptoms		
Intravenous opioids should be considered to relieve pain.	IIa	C
A mild tranquilizer should be considered in very anxious patients.	IIa	C
Intravenous beta-blockers		
Intravenous beta-blockers (preferably metoprolol) should be considered at the time of presentation in patients undergoing PPCI with no signs of acute heart failure, an SBP >120 mmHg, and no other contraindications.	IIa	A

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Recommendations for the initial management of patients with acute coronary syndrome (2)

Recommendations	Class	Level
Pre-hospital logistics of care		
It is recommended that the pre-hospital management of patients with a working diagnosis of STEMI is based on regional networks designed to deliver reperfusion therapy expeditiously and effectively, with efforts made to make PPCI available to as many patients as possible.	I	B
It is recommended that PPCI-capable centres deliver a 24/7 service and are able to perform PPCI without delay.	I	B
It is recommended that patients transferred for PPCI bypass the emergency department and CCU/ICU and are transferred directly to the catheterization laboratory.	I	B
It is recommended that EMS transfer patients with suspected STEMI to a PCI-capable centre, bypassing non-PCI centres.	I	C

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Revised recommendations (3)

2017 and 2020	Class	Level	2023	Class	Level
Recommendations for antiplatelet and anticoagulant therapy in STEMI					
A potent $P2Y_{12}$ inhibitor (prasugrel or ticagrelor), or clopidogrel if these are not available or are contraindicated, is recommended before (or at latest at the time of) PCI, and maintained over 12 months, unless there are contraindications such as excessive risk of bleeding.	I	A	Pre-treatment with a $P2Y_{12}$ receptor inhibitor may be considered in patients undergoing a primary PCI strategy.	IIb	B

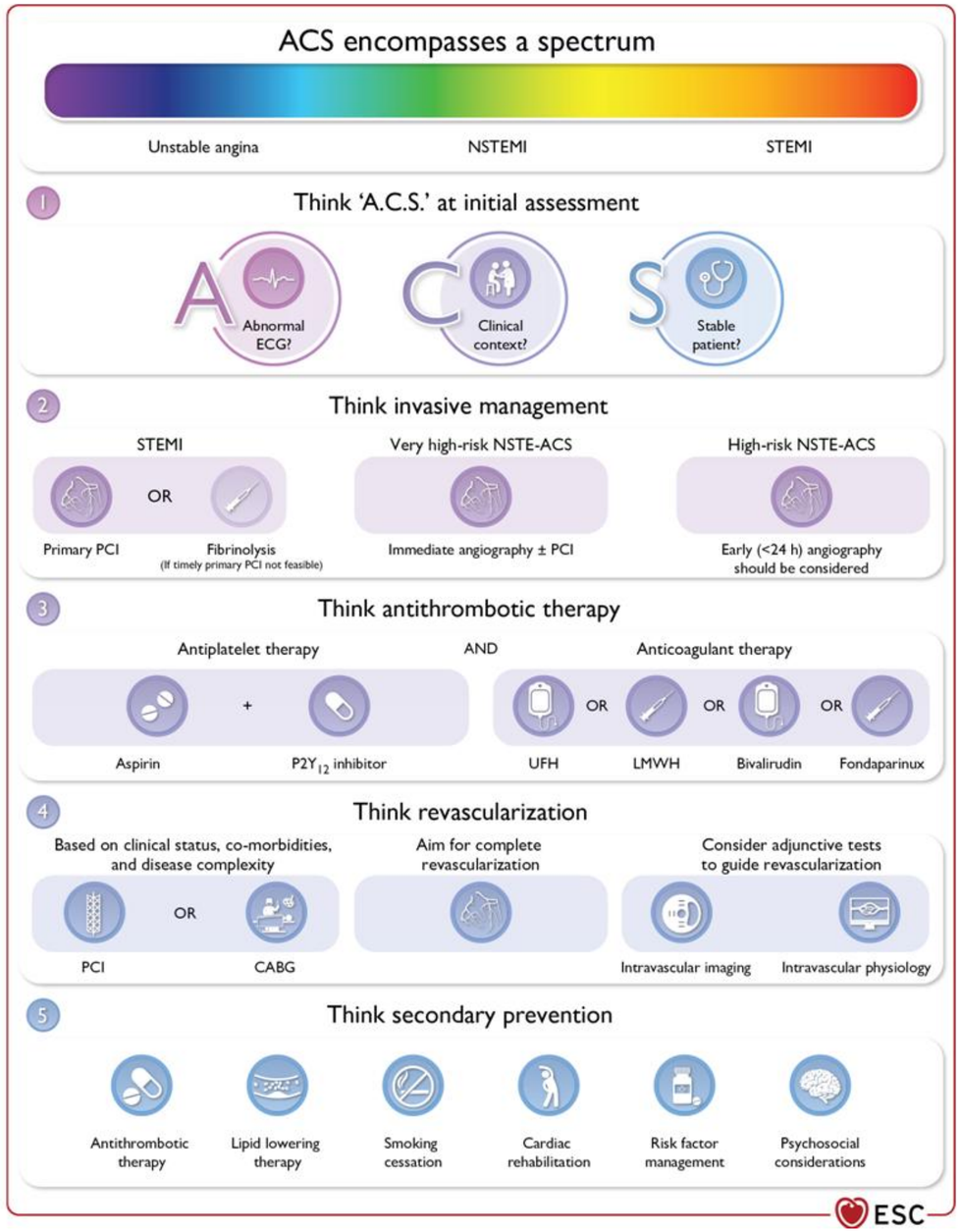
Recommendations for cardiac arrest and out-of-hospital cardiac arrest (1)

Recommendations	Class	Level
Cardiac arrest and OHCA		
A PPCI strategy is recommended in patients with resuscitated cardiac arrest and an ECG with persistent ST-segment elevation (or equivalents).	I	B
Routine immediate angiography after resuscitated cardiac arrest is not recommended in haemodynamically stable patients without persistent ST-segment elevation (or equivalents).	III	A
Temperature control		
Temperature control (i.e. continuous monitoring of core temperature and active prevention of fever [i.e. >37.7ºC]) is recommended after either out-of-hospital or in-hospital cardiac arrest for adults who remain unresponsive after return of spontaneous circulation.	I	B

2023 ESC Guidelines for the management of acute coronary syndromes
(European Heart Journal; 2023 – doi:10.1093/eurheartj/ehad191)

Recommendations for cardiac arrest and out-of-hospital cardiac arrest (2)

Recommendations	Class	Level
Systems of care		
It is recommended that healthcare systems implement strategies to facilitate transfer of all patients in whom ACS is suspected after resuscitated cardiac arrest directly to a hospital offering 24/7 PPCI via one specialized EMS.	I	C
Transport of patients with OHCA to a cardiac arrest centre according to local protocols should be considered.	IIa	C
Evaluation of neurological prognosis		
Evaluation of neurological prognosis (no earlier than 72 h after admission) is recommended in all comatose survivors after cardiac arrest.	I	C


ACS encompasses a spectrum
Unstable angina
NSTEMI
STEMI
1
Think 'A.C.S.' at initial assessment
A
Abnormal ECG?
C
Clinical context?
S
Stable patient?
2
Think invasive management
STEMI
OR
Primary PCI
Fibrinolysis
(If timely primary PCI not feasible)
Very high-risk NSTE-ACS
Immediate angiography ± PCI
High-risk NSTE-ACS
Early (<24 h) angiography should be considered
3
Think antithrombotic therapy
Antiplatelet therapy
AND
Anticoagulant therapy
+
OR
OR
OR
Aspirin
P2Y12 inhibitor
UFH
LMWH
Bivalirudin
Fondaparinux
4
Think revascularization
Based on clinical status, co-morbidities, and disease complexity
Aim for complete revascularization
Consider adjunctive tests to guide revascularization
OR
PCI
CABG
Intravascular imaging
Intravascular physiology
5
Think secondary prevention
Antithrombotic therapy
Lipid lowering therapy
Smoking cessation
Cardiac rehabilitation
Risk factor management
Psychosocial considerations
ESC

DĚKUJEME ZA POZORNOST

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