Göğüs ağrılı hastalarda koroner risk skorlarının karşılaştırılması

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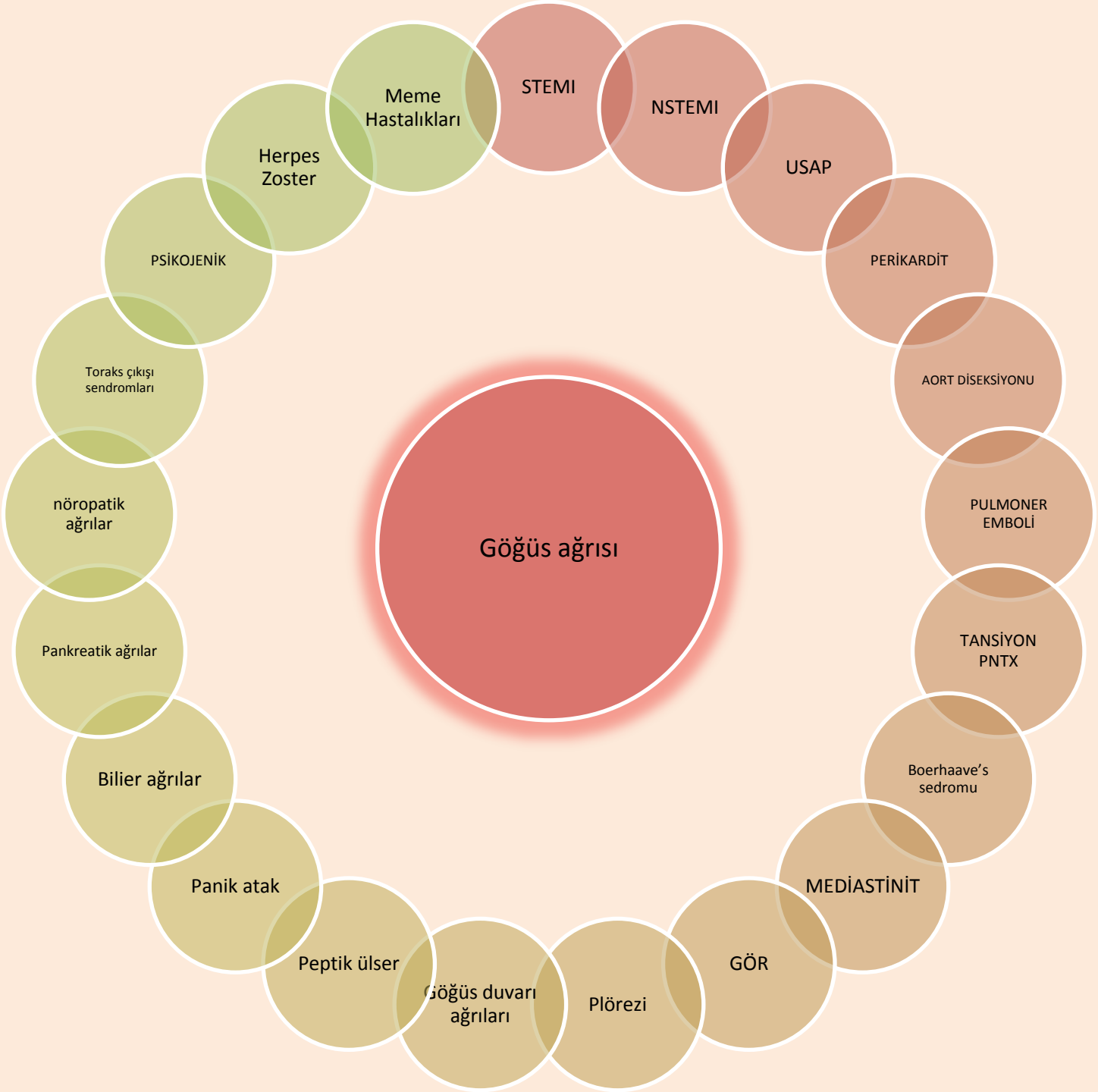
Sunu Planı

- Giriş
- AKS skorları
- Karşılaştırma


Göğüs Ağrısı
Yılda > 6 milyon hasta
AKS % 12-15
Yanlış tanı %2-4
EKG ve Troponin AKS'yi Dışlamada yetersiz
Prognoz atlanan AKS de daha kötü
Ayırıcı tanı çok ve ciddi
> Acil serviste takip süresi
> Radyasyon maruziyeti
> Maliyet
> Kalabalık acil servis


Göğüs ağrısı
STEMI
NSTEMI
USAP
PERİKARDİT
AORT DİSEKSİYONU
PULMONER EMBOLİ
TANSİYON PNTX
Boerhaave's sedromu
MEDİASTİNİT
GÖR
Plörezi
Göğüs duvarı ağrıları
Peptik ülser
Panik atak
Bilier ağrılar
Pankreatik ağrılar
nöropatik ağrılar
Toraks çıkışı sendromları
PSİKOJENİK
Herpes Zoster
Meme Hastalıkları

- Göğüs ağrısı olan hastalarda öncelikle yüksek riskli AKS'nin tanımlanması gerekmektedir.

- Yüksek riskli hastalar, erken agresif tedavilerden en fazla yararlanacaktır.

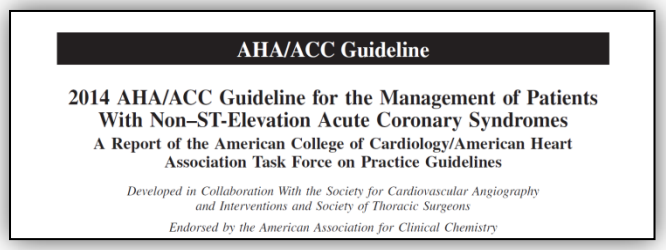
- Risk puanına göre erken yada gecikmiş invazif tedavi planlaması yapılır

Summary of Recommendations for Prognosis: Early Risk Stratification

Recommendations	COR	LOE	References
Perform rapid determination of likelihood of ACS, including a 12-lead ECG within 10 min of arrival at an emergency facility, in patients whose symptoms suggest ACS	I	C	21
Perform serial ECGs at 15- to 30-min intervals during the first hour in symptomatic patients with initial nondiagnostic ECG	I	C	N/A
Measure cardiac troponin (cTnI or cTnT) in all patients with symptoms consistent with ACS*	I	A	21, 64, 67–71
Measure serial cardiac troponin I or T at presentation and 3–6 h after symptom onset* in all patients with symptoms consistent with ACS	I	A	21, 72–74
Use risk scores to assess prognosis in patients with NSTE-ACS	I	A	42–44, 75–80
Risk-stratification models can be useful in management	IIa	B	42–44, 75–81
Obtain supplemental electrocardiographic leads V_7 to V_9 in patients with initial nondiagnostic ECG at intermediate/high risk for ACS	IIa	B	82–84
Continuous monitoring with 12-lead ECG may be a reasonable alternative with initial nondiagnostic ECG in patients at intermediate/high risk for ACS	IIb	B	85, 86
BNP or NT–pro-BNP may be considered to assess risk in patients with suspected ACS	IIb	B	87–91

*See Section 3.4, Class I, #3 recommendation if time of symptom onset is unclear.

ACS indicates acute coronary syndromes; BNP, B-type natriuretic peptide; COR, Class of Recommendation; cTnI, cardiac troponin I; cTnT, cardiac troponin T; ECG, electrocardiogram; LOE, Level of Evidence; N/A, not available; NSTE-ACS, non–ST-elevation acute coronary syndromes; and NT–pro-BNP, N-terminal pro-B-type natriuretic peptide.



Factors Associated With Appropriate Selection of Early Invasive Strategy or Ischemia-Guided Strategy in Patients With NSTE-ACS

Immediate invasive (within 2 h)	Refractory angina
	Signs or symptoms of HF or new or worsening mitral regurgitation
	Hemodynamic instability
	Recurrent angina or ischemia at rest or with low-level activities despite intensive medical therapy
	Sustained VT or VF
Ischemia-guided strategy	Low-risk score (eg, TIMI [0 or 1], GRACE [<109])
	Low-risk Tn-negative female patients
	Patient or clinician preference in the absence of high-risk features
Early invasive (within 24 h)	None of the above, but GRACE risk score >140
	Temporal change in Tn (Section 3.4)
	New or presumably new ST depression
Delayed invasive (within 25–72 h)	None of the above but diabetes mellitus Renal insufficiency (GFR <60 mL/min/1.73 m^2)
	Reduced LV systolic function (EF <0.40)
	Early postinfarction angina
	PCI within 6 mo
	Prior CABG
	GRACE risk score 109–140; TIMI score ≥2

AHA/ACC Guideline

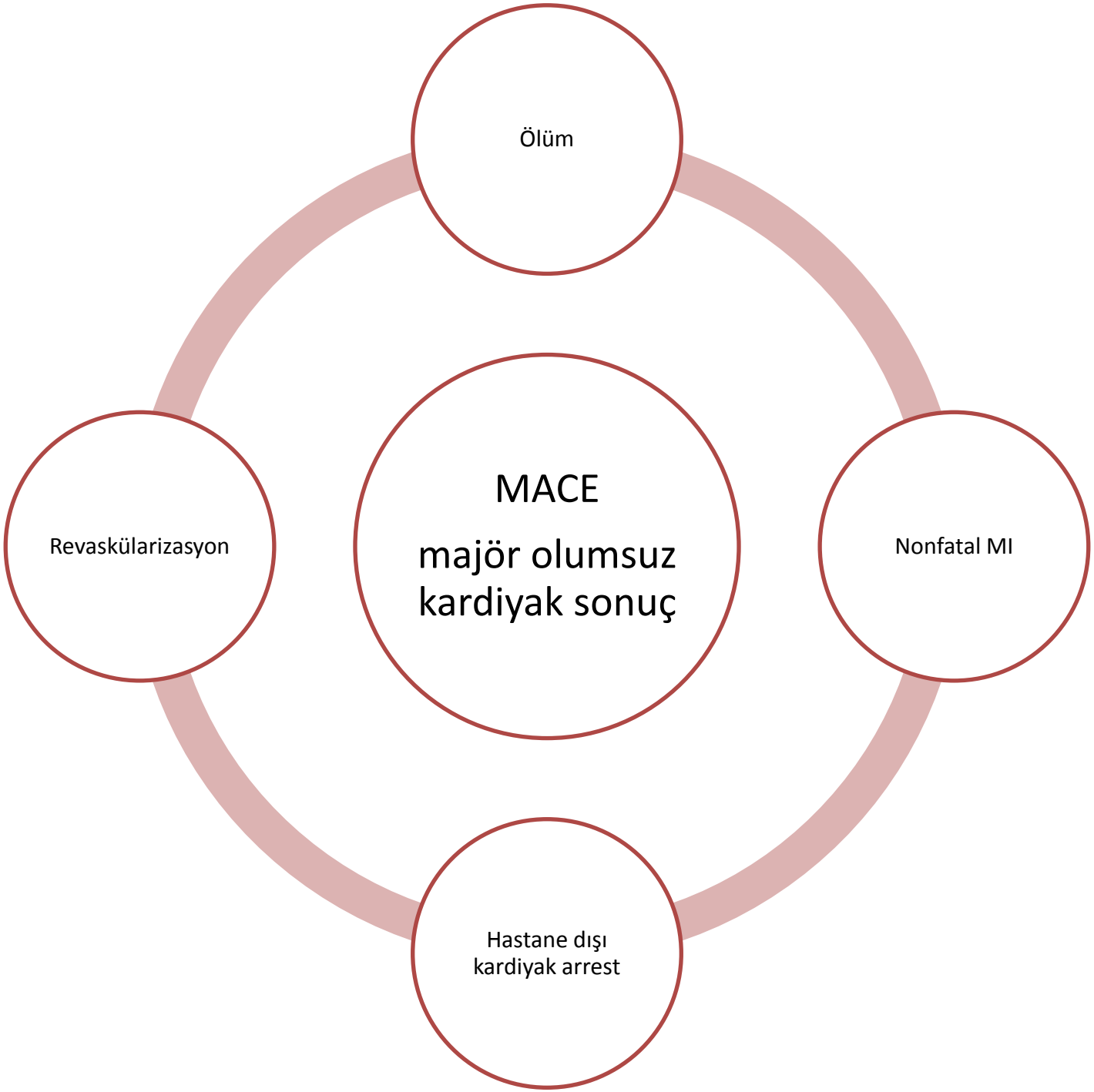
2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Developed in Collaboration With the Society for Cardiovascular Angiography and Interventions and Society of Thoracic Surgeons

Endorsed by the American Association for Clinical Chemistry


RİSK SKORLARI
TIMI
ADAPT
GARACE
EDACS
HEART
Hess
Vancouver
Banach Scale
PURSUİT
Modifiye Goldman
Sanchis


Ölüm
Revaskülarizasyon
MACE
majör olumsuz kardiyak sonuç
Nonfatal MI
Hastane dışı kardiyak arrest

TIMI (Thrombolysis In Myocardial Infarction)

1	Yaş > 65	1
		0
2	Yeni gelişen ST değişikliği	1
		0
3	Koroner Arter Hastalığı için en az 3 risk faktörü (Ailede KAH öyküsü, hipertansiyon, hiperkolesterolemi, diabetes mellitus, sigara)	1
		0
4	Var olan %50 den fazla koroner stenoz,	1
		0
5	Son 24 saatte en az 2 anjina atağı	1
		0
6	Son 7 gün içinde ASA alımı	1
		0
7	CK-MB ve / veya Kardiyak Troponinler de yükselme	1
		0

Modified TIMI score

Modified TIMI score	Yes	No
Age ≥65	1	
≥3 risk factors for ACS; hypertension, hyperlipidemia, smoking, diabetes, family history	1	
Use of aspirin in last 7 days	1	
Prior coronary stenosis ≥50%	1	
≥2 angina events in 24 hours or persisting discomfort	1	
ST-segment deviation of ≥0.05 mV on initial ECG	5*	
Elevated cardiac biomarkers	5*	
Total score		

Cut-points: Low risk = 0-2 points; High risk = 3-10 points

* The presence of either or both variables attracts value of 5 points giving a total possible m TIMI score of 10.

TIMI Risk Score for NSTE-ACS

TIMI Risk Score	All-Cause Mortality, New or Recurrent MI, or Severe Recurrent Ischemia Requiring Urgent Revascularization Through 14 d After Randomization, %
0–1	4.7
2	8.3
3	13.2
4	19.9
5	26.2
6–7	40.9

GRACE

(Global Registry of Acute Coronary Events)

- Risk belirlemede daha güvenilir
- TIMI'den daha kompleks
- Bir çok değişkene sahip
- Acil servise başvuran hastalarda tüm değişkenlerine ulaşmak zor

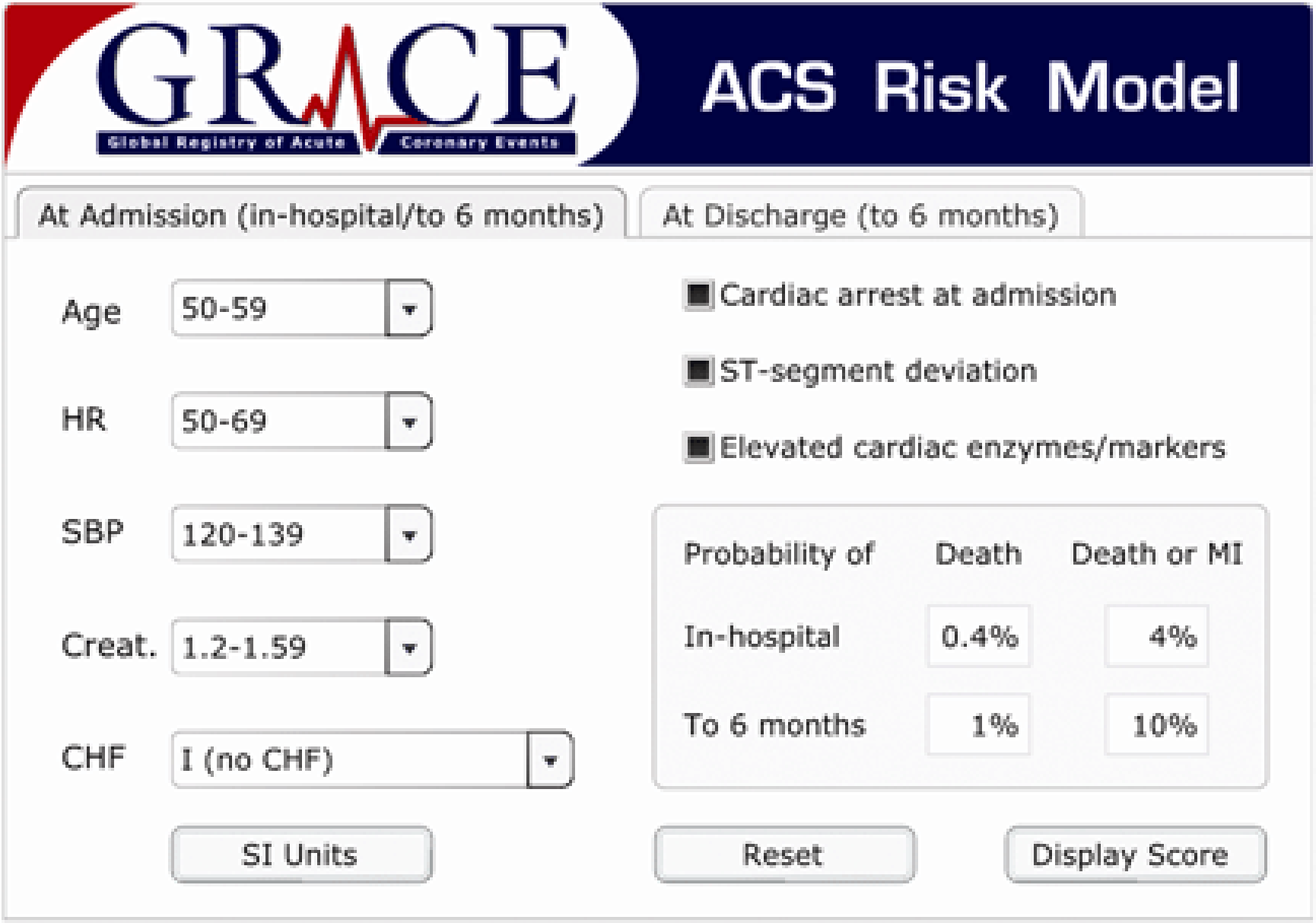
1. Find Points for Each Predictive Factor:

Killip Class	Points	SBP, mm Hg	Points	Heart Rate, Beats/min	Points	Age, y	Points	Creatinine Level, mg/dL	Points
I	0	≤80	58	≤50	0	≤30	0	0-0.39	1
II	20	80-99	53	50-69	3	30-39	8	0.40-0.79	4
III	39	100-119	43	70-89	9	40-49	25	0.80-1.19	7
IV	59	120-139	34	90-109	15	50-59	41	1.20-1.59	10
		140-159	24	110-149	24	60-69	58	1.60-1.99	13
		160-199	10	150-199	38	70-79	75	2.00-3.99	21
		≥200	0	≥200	46	80-89	91	>4.0	28
						≥90	100		

Other Risk Factors	Points
Cardiac Arrest at Admission	39
ST-Segment Deviation	28
Elevated Cardiac Enzyme Levels	14

2. Sum Points for All Predictive Factors:

	Killip Class	+		SBP	+		Heart Rate	+		Age	+		Creatinine Level	+		Cardiac Arrest at Admission	+		ST-Segment Deviation	+		Elevated Cardiac Enzyme Levels	=		Total Points


GRACE
Global Registry of Acute Coronary Events
ACS Risk Model
At Admission (in-hospital/to 6 months)
At Discharge (to 6 months)
Age
50-59
HR
50-69
SBP
120-139
Creat.
1.2-1.59
CHF
I (no CHF)
SI Units
Cardiac arrest at admission
ST-segment deviation
Elevated cardiac enzymes/markers
Probability of
Death
Death or MI
In-hospital
0.4%
4%
To 6 months
1%
10%
Reset
Display Score

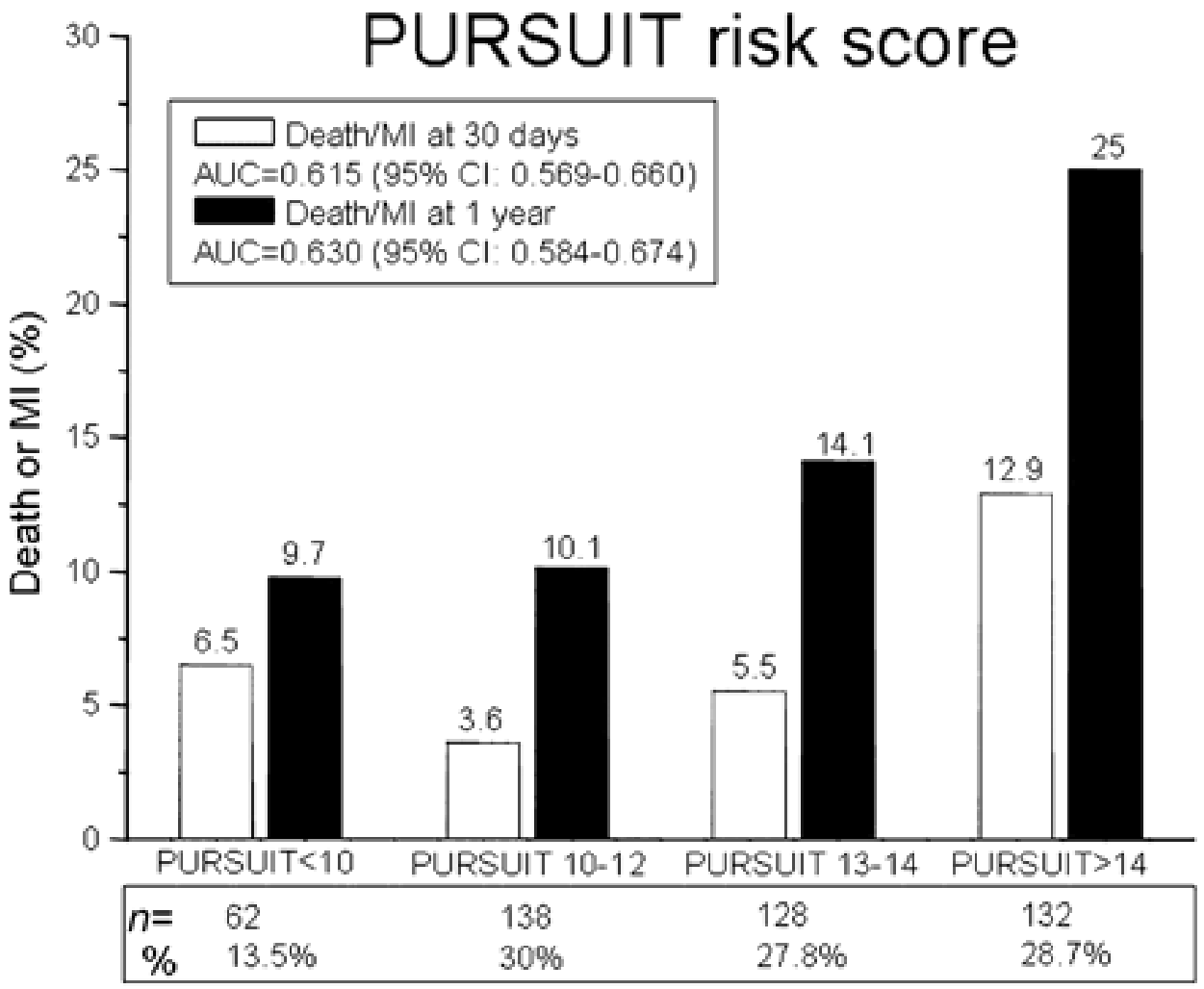
Risk kategorisi (tertil)	GRACE risk skoru	Hastanede ölümler (%)
Düşük	≤ 108	< 1
Orta	109–140	1–3
Yüksek	> 140	> 3
Risk kategorisi (tertil)	**GRACE risk skoru**	**Taburcu olduktan 6. aya kadar ölümler (%)**
Düşük	≤ 88	< 3
Orta	89–118	3–8
Yüksek	> 118	> 8

PURSUİT (Platelet Glycoprotein IIb/IIIa in Unstable Angina: Receptor Suppression Using Integrilin Therapy)

Age (decade)	50	8
	60	9
	70	11
	80	12
Sex	Male	1
	Female	0
Worst CCS class past 6 weeks	No angina/CCS I/II	0
	CCS III/IV	2
Signs of heart failure		2
ST depression on ECG		1
		Total

Kanada kardiyovasküler cemiyeti (CCS) angina pektoris sınıflaması

- SINIF – I : Sıradan egzersizlerde rahat. Ciddi, zorlu, uzun egzersizle ağrı
- SINIF – II : Sıradan egzersizle ağrı. Merdiven/postprandiyal yürüme
- SINIF – III : Sıradan egzersizlerde ciddi kısıtlama , iki kat çıkamama..
- SINIF – IV : Hafif eforla/istirahatte angina.


PURSUIT risk score
Death/MI at 30 days
AUC=0.615 (95% CI: 0.569-0.660)
Death/MI at 1 year
AUC=0.630 (95% CI: 0.584-0.674)
Death or MI (%)
30
25
20
15
10
5
0
6.5
9.7
3.6
10.1
5.5
14.1
12.9
25
PURSUIT<10
PURSUIT 10-12
PURSUIT 13-14
PURSUIT>14
n= 62 138 128 132
% 13.5% 30% 27.8% 28.7%

FRISC (Fast Revascularisation in Instability in Coronary disease)

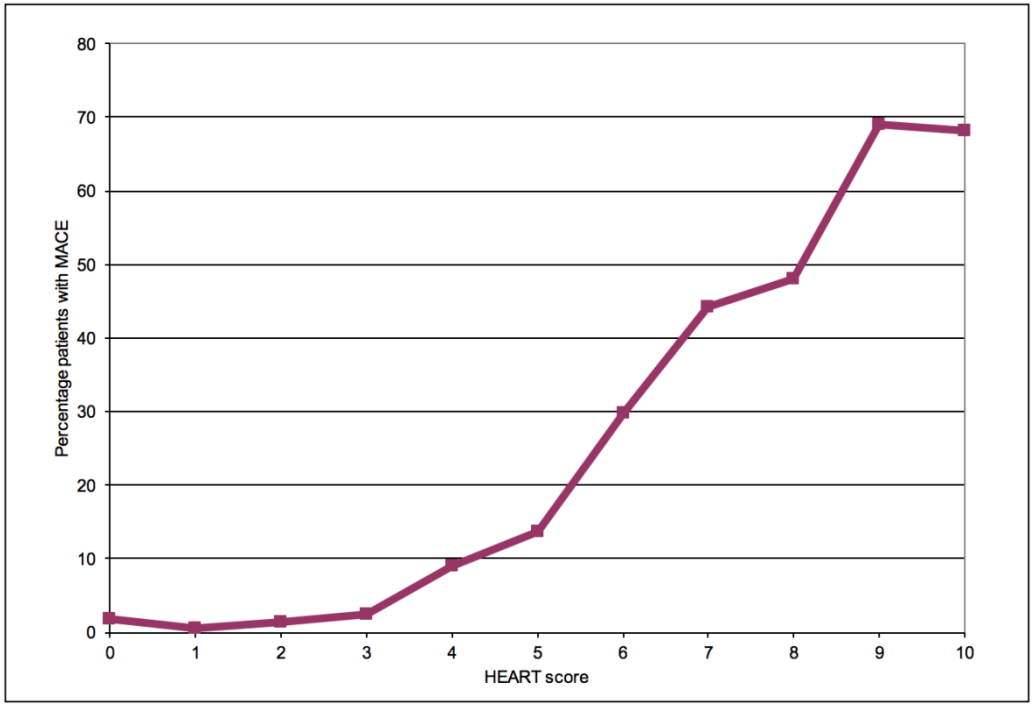
Age ≥ 70 years	0
	1
Male sex	0
	1
Diabetes	0
	1
Previous MI	0
	1
ST depression on ECG	0
	1
Elevated Troponin levels	0
	1
Elevated Interleukin 6 or CRP 	0
	1
	Total

HEART

History (Anamnesis)	Highly suspicious	2	
	Moderately suspicious	1	
	Slightly suspicious	0	
ECG	Significant ST-deviation	2	
	Non-specific repolarisation disturbance / LBBB / PM	1	
	Normal	0	
Age	≥ 65 years	2	
	45 – 65 years	1	
	≤ 45 years	0	
Risk factors	≥ 3 risk factors *or* history of atherosclerotic disease	2	
	1 or 2 risk factors	1	
	No risk factors known	0	
Troponin	≥ 3x normal limit	2	
	1-3x normal limit	1	
	≤ normal limit	0	
		Total	

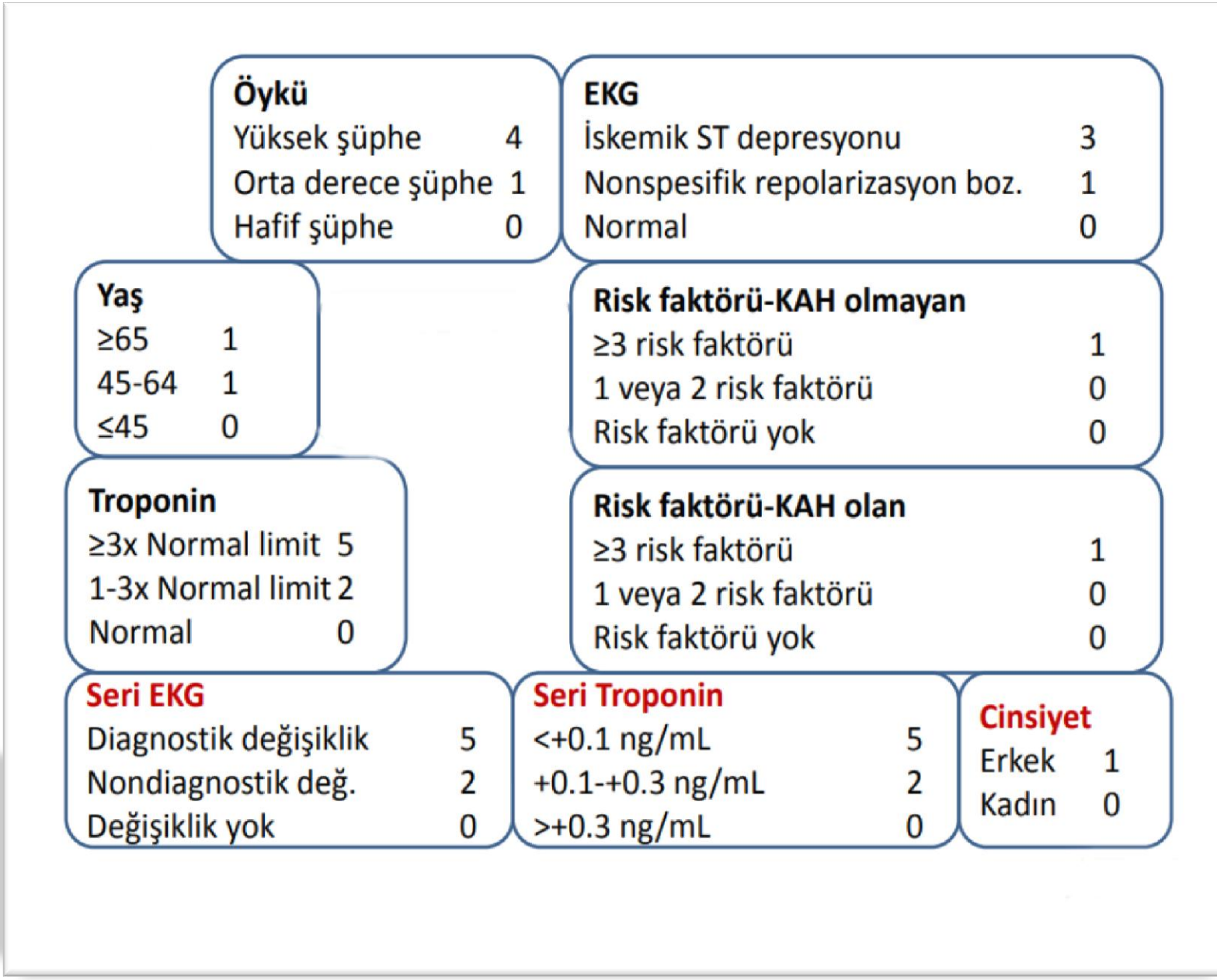
Risk factors for atherosclerotic disease:

Hypercholesterolemia	Cigarette smoking
Hypertension	Positive family history
Diabetes Mellitus	Obesity (BMI>30)



HEART	~ % pts	MACE/n	MACE	Death	Proposed Policy
0-3	32%	38/1993	1.9%	0.05%	Discharge
4-6	51%	413/3136	13%	1.3%	Observation, risk management
7-10	17%	518/1045	50%	2.8%	Observation, treatment, CAG

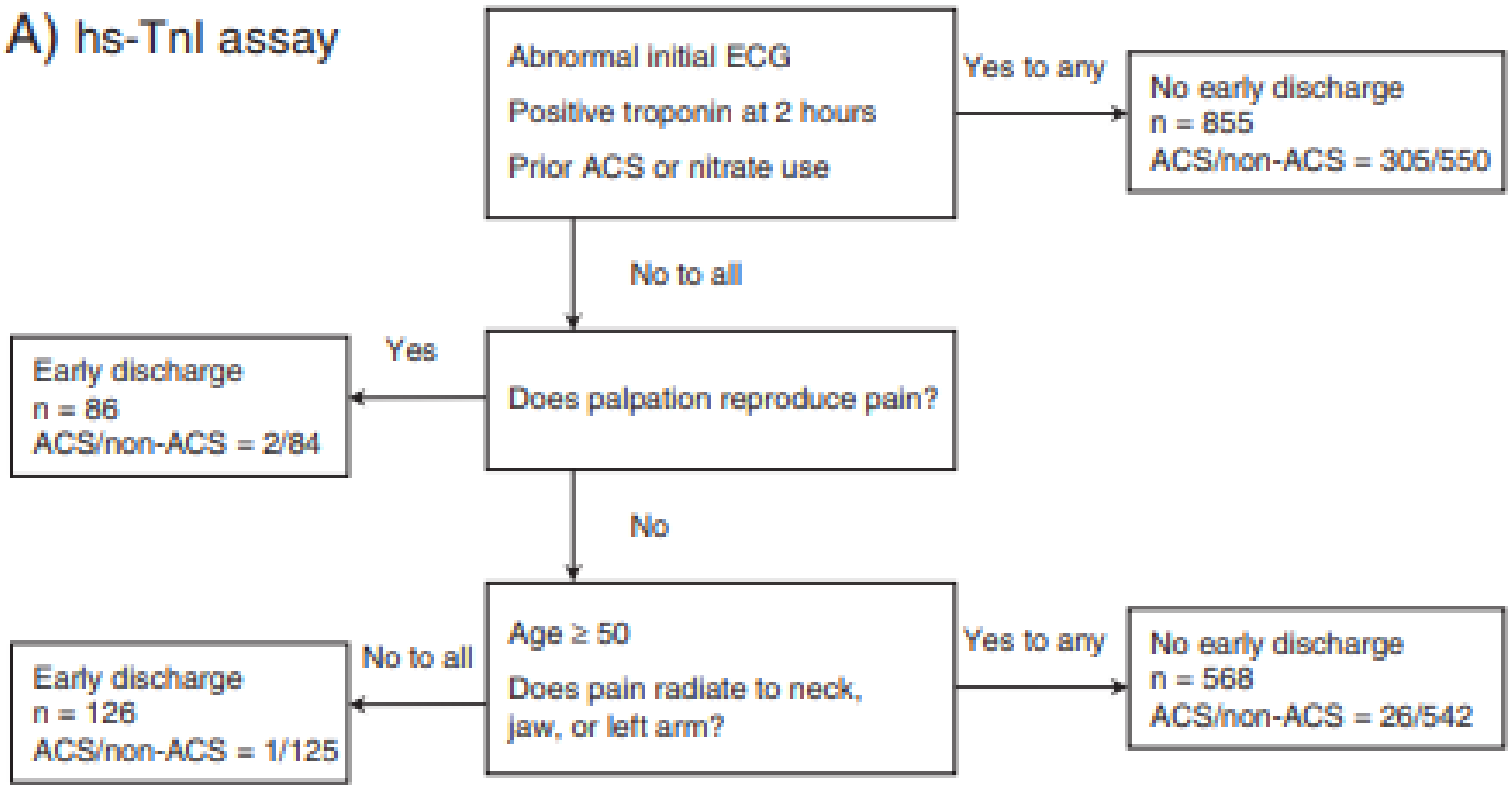
HEART S3


Öykü
Yüksek şüphe 4
Orta derece şüphe 1
Hafif şüphe 0
EKG
İskemik ST depresyonu 3
Nonspesifik repolarizasyon boz. 1
Normal 0
Yaş
≥65 1
45-64 1
≤45 0
Risk faktörü-KAH olmayan
≥3 risk faktörü 1
1 veya 2 risk faktörü 0
Risk faktörü yok 0
Troponin
≥3x Normal limit 5
1-3x Normal limit 2
Normal 0
Risk faktörü-KAH olan
≥3 risk faktörü 1
1 veya 2 risk faktörü 0
Risk faktörü yok 0
Seri EKG
Diagnostik değişiklik 5
Nondiagnostik değ. 2
Değişiklik yok 0
Seri Troponin
<+0.1 ng/mL 5
+0.1-+0.3 ng/mL 2
>+0.3 ng/mL 0
Cinsiyet
Erkek 1
Kadın 0

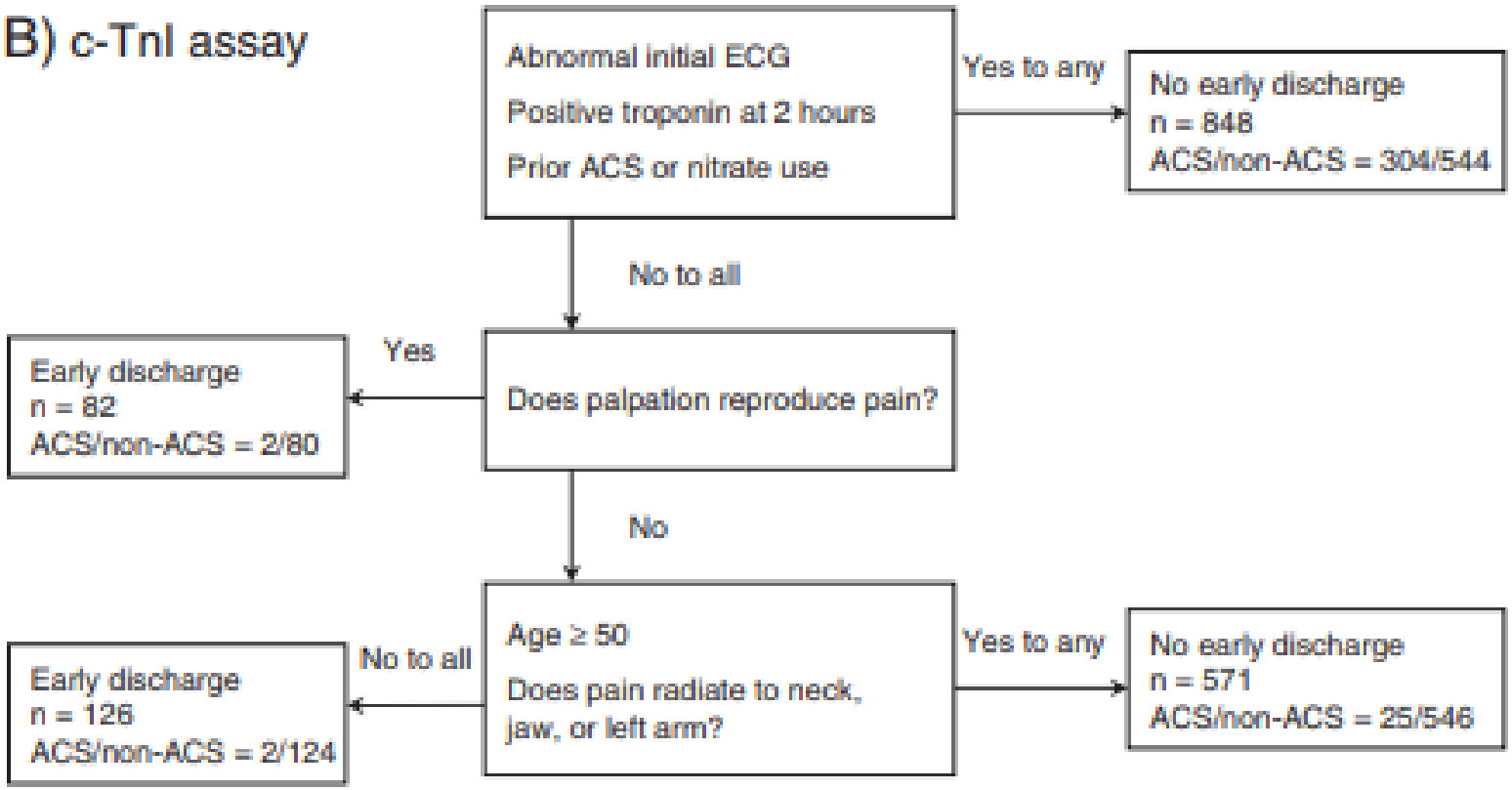
	TIMI UA/NSTEMI[12]	PURSUIT[13]	GRACE In-hospital[14]	GRACE 6-months[16]
Year published	2000	2000	2003	2004
Derivation population	Clinical trial (TIMI-11B)	Clinical trial (PURSUIT)	International registry (GRACE)	International registry (GRACE)
Range of ACS	UA and NSTEMI	UA and NSTEMI	UA, NSTEMI and STEMI	UA, NSTEMI and STEMI
Number of patients	1957	9461	11,389	15,007
Adverse risk factors	Age >65 years	Advanced age	Advanced age	Advanced age
	>3 risk factors for CAD	Female sex	Higher Killip class	History of MI
	Prior coronary stenosis of ≥50%	Worst angina CCS class	Lower systolic blood pressure	History of heart failure
	ST-segment deviation on presentation	Higher heart rate	ST-segment deviation	Not having inpatient PCI
	At least 2 anginal events in prior 24 hours	Lower systolic blood pressure	Cardiac arrest during presentation	Lower systolic blood pressure
	Use of aspirin in prior 7 days	Signs of heart failure	Higher serum creatinine	Higher serum creatinine
	Elevated serum cardiac markers	ST-depression on presentation	Elevated serum cardiac markers	Elevated serum cardiac markers
			Higher heart rate	Higher heart rate
				ST-segment depression
Predicted outcomes	Death, MI or revascularisation	Death and MI	Death	Death
Time to outcomes	14 days	30 days	In-hospital	6 months

	PURSUIT		TIMI	GRACE	FRISC		HEART
Population	UA/NSTEMI		UA/NSTEMI	All ACS	UA/NSTEMI		All Chest Pain
Outcome	Death	Death/MI			Death	Death/MI	
Key elements	5		7	8	7		5
Age	X		X	X	X		X
Gender	X				X		
Prior MI/CAD			X		X		X
DM, CRF's			X		X		X
Symptoms/History	X		X				X
Use of aspirin			X				
Weight							
HR				X			
SBP				X			
CHF/Killip class	X			X			
ECG	X		X	X	X		X
CKMB/cTn			X	X	X		X
Serum Cr				X			
Serum Interl-6/CRP				X	X		
Cardiac Arrest							
Possible max score	18		7	372	7		10
c-statistic	0.84	0.67	0.65	0.83	0.77	0.70	0.90
Computer needed				Yes			

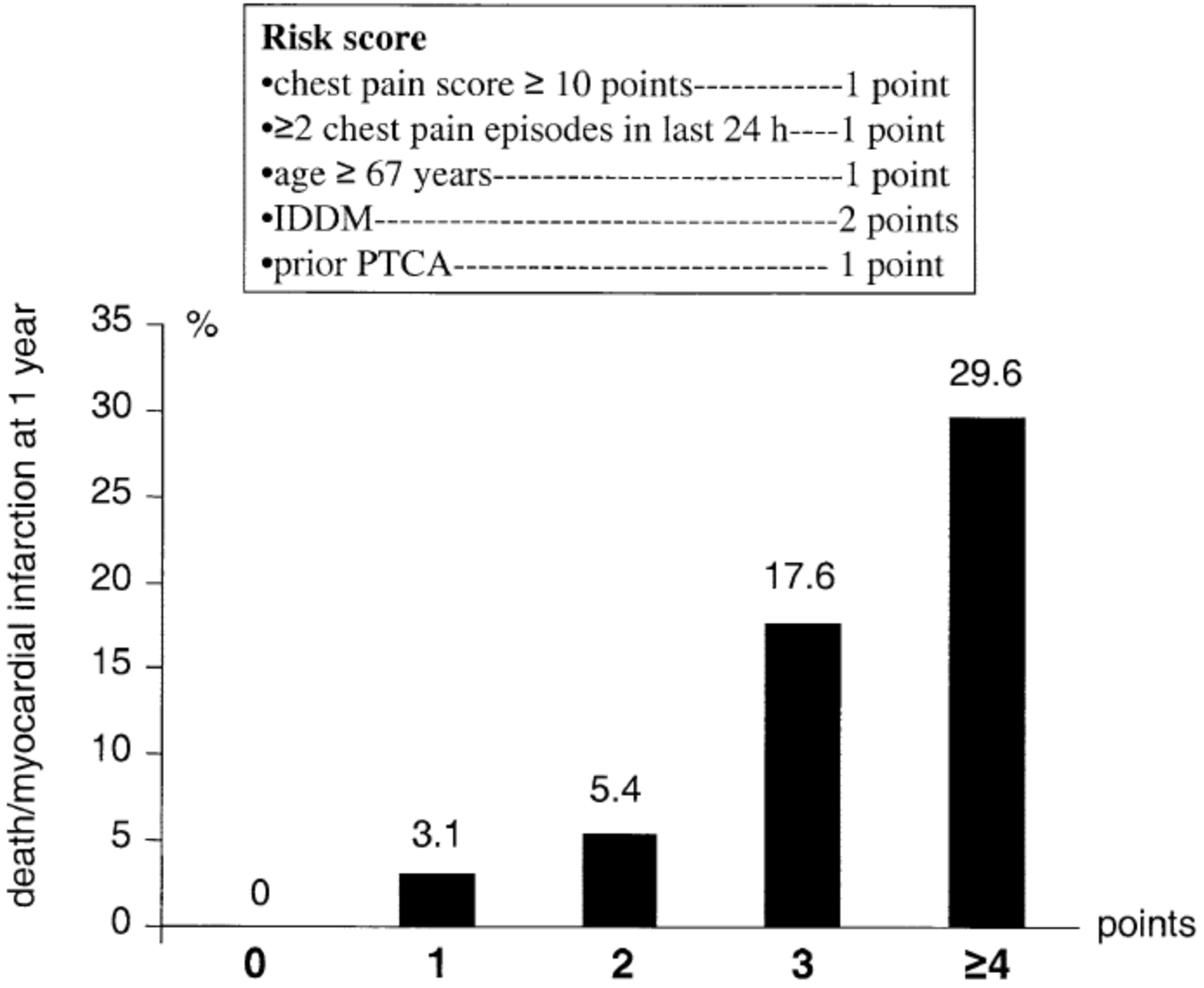
Vancouver Chest Pain Rule



Vancouver Chest Pain Rule



Sanchis


Risk score
•chest pain score ≥ 10 points----------1 point
•≥2 chest pain episodes in last 24 h----1 point
•age ≥ 67 years----------1 point
•IDDM----------2 points
•prior PTCA---------- 1 point
death/myocardial infarction at 1 year
%
35
30
25
20
15
10
5
0
0
3.1
5.4
17.6
29.6
0
1
2
3
≥4
points

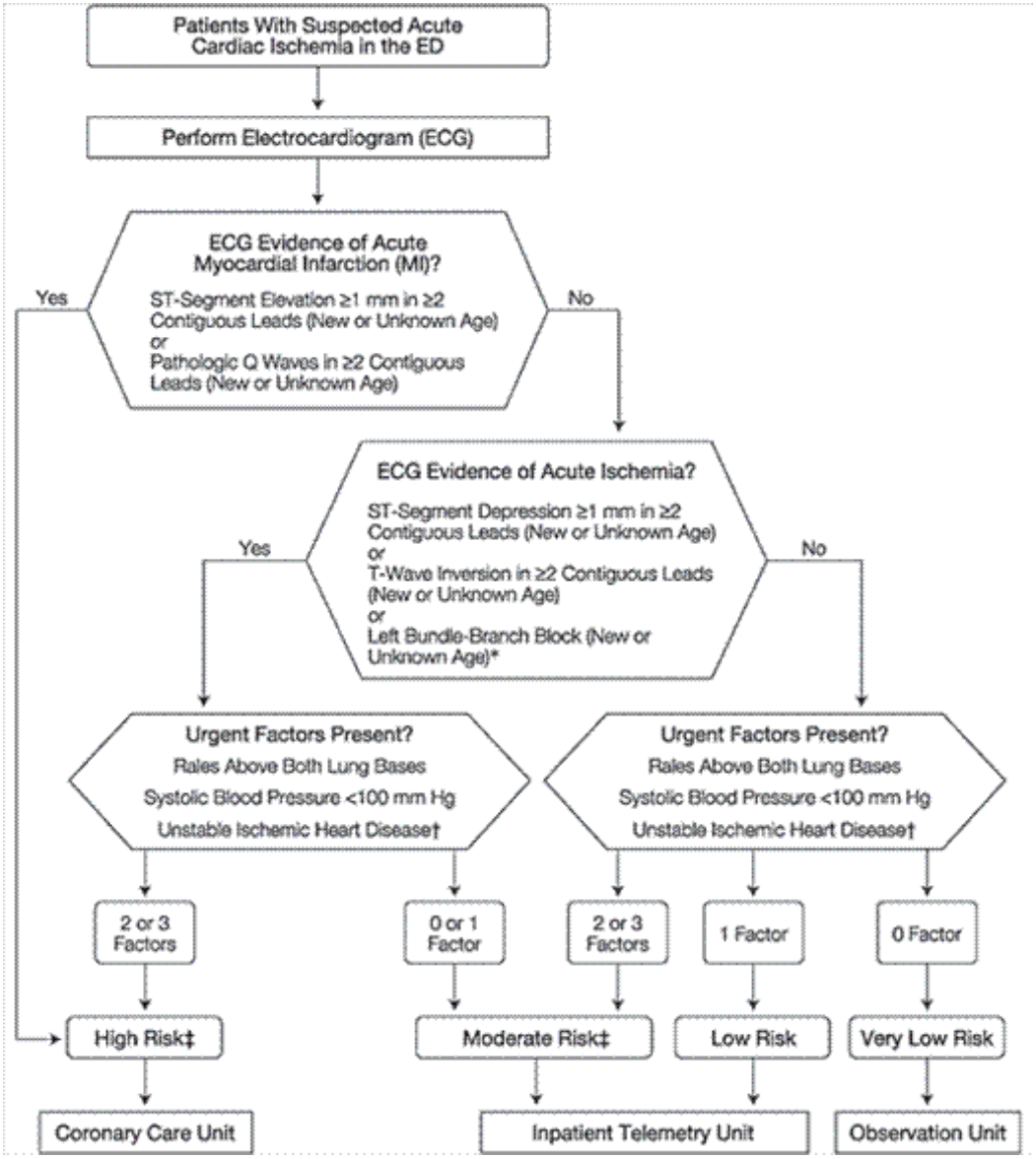
Chest Pain Score	
Location	
Substernal	+3
Precordial	+2
Neck, jaw, epigastrium	+1
Apical	−1
Radiation	
Either arm	+2
Shoulder, back, neck, jaw	+1
Characteristics	
Crushing, pressing, squeezing	+3
Heaviness, tightness	+2
Sticking, stabbing, pinprick, catching	−1
Severity	
Severe	+2
Moderate	+1
Influenced by	
Nitroglycerin	+1
Stature	−1
Breathing	−1
Associated symptoms	
Dyspnea	+2
Nausea or vomiting	+2
Diaphoresis	+2
History of exertional angina	+3

Eur Heart J. 2000 Mar;21(5):397-406.

Safety and prognostic value of early dobutamine-atropine stress echocardiography in patients with spontaneous chest pain and a non-diagnostic electrocardiogram.

Geleijnse ML[1], Elhendy A, Kasprzak JD, Rambaldi R, van Domburg RT, Cornel JH, Klootwijk AP, Fioretti PM, Roelandt JR, Simoons ML.

Modifiye Goldman kuralı



Banach Scale

Risk Score for 1-Year Mortality in ACS Patients

· Aborted sudden cardiac death before or on admission	1 point
· Pulmonary edema before or on admission	1 point
· Age >65 years	1 point
· His bundle block on first ECG on admission	1 point
· Heart failure (NYHA III/IV) in patient's history	1 point
· ST-depression on first ECG on admission	1 point
· Heart rate >78 beats/min in admission findings	1 point
· ST elevation (anterolateral) on first ECG on admission	1 point
· Elevated cardiac markers on admission	1 point
· Q wave in any lead in first ECG on admission	1 point
· Angina de novo <2 weeks in patient's history as the presenting complaint	–1 point
· SBP >130 mmHg on admission	–1 point

EDACS

Emergency Department Assessment of Chest pain Score

EMERGENCY DEPARTMENT ASSESSMENT OF CHEST PAIN SCORE (EDACS)	
Clinical Characteristics	Score
a) Age (Please Circle SINGLE Best Answer)	
18–45	+2
46–50	+4
51–55	+6
56–60	+8
61–65	+10
66–70	+12
71–75	+14
76–80	+16
81–85	+18
86 +	+20
b) Male sex (Please circle if true)	+6
c) Aged 18–50 years and either: (i) known coronary artery disease or (ii) ≥3 risk factors	+4
d) Symptoms and signs (Circle each if present)	
Diaphoresis	+3
Radiates to arm or shoulder	+5
Pain† occurred or worsened with inspiration	–4
Pain† is reproduced by palpation	–6
EDACS Total (Please Add all circled figures and enter to right)	_____

Cut-point: Low-risk = <16 points; High risk = ≥16 points

Risk factors = family history of premature CAD, dislipidaemia, diabetes, hypertension, current smoker.

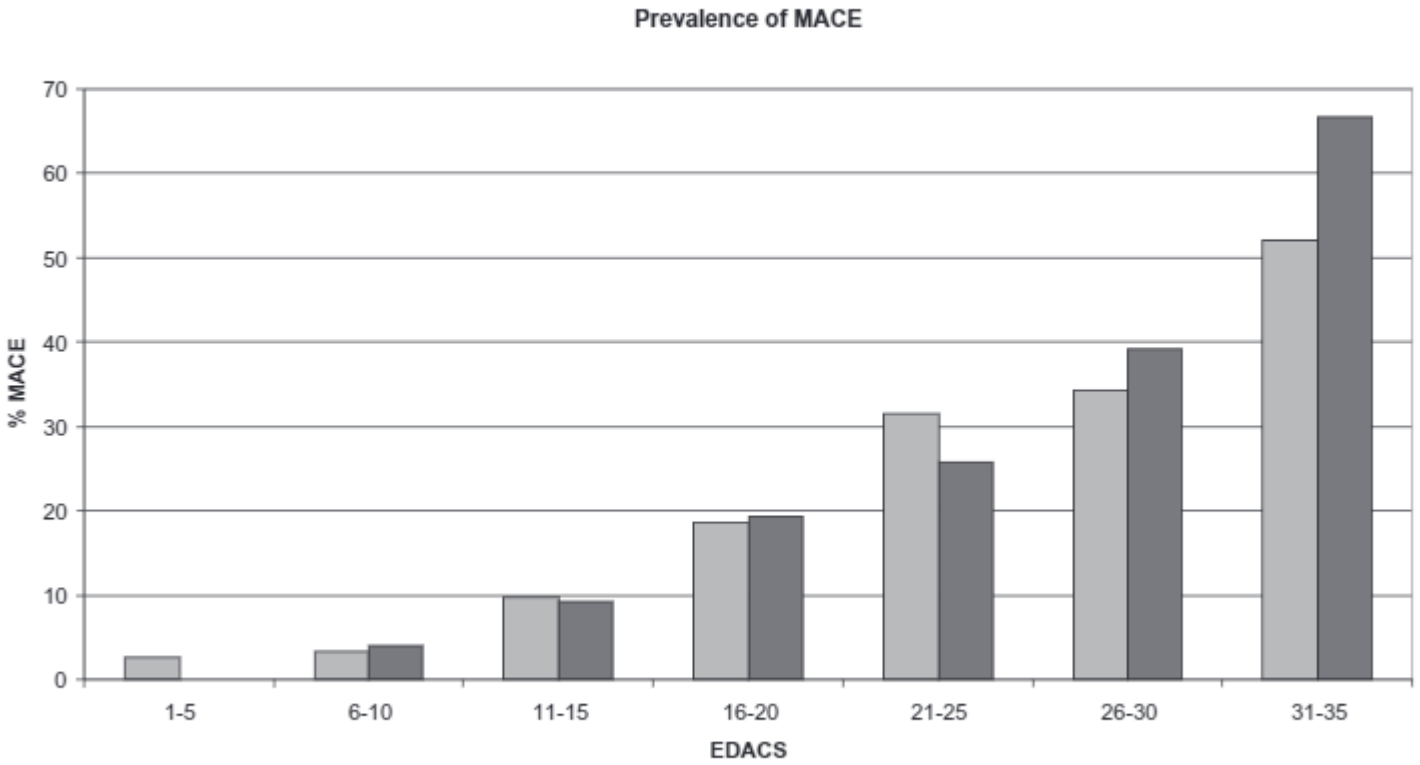


Figure 1. Prevalence of MACE in the derivation and validation cohorts. EDACS, Emergency Department Assessment of Chest pain Score. MACE, major adverse cardiac event; (□), Derivation; (■), validation.

EDACS	Emergency Department Assessment of Chest pain Score A clinical score to predict the short-term risk of major adverse cardiac event for adults presenting to the ED with possible cardiac chest pain.
EDACS-ADP	Emergency Department Assessment of Chest pain Score-Accelerated Diagnostic Protocol A chest pain clinical investigation pathway that combines the EDACS below a specified score cut-off with negative ECG and troponin results to identify a low-risk subgroup of patients. These patients are at low short-term risk of MACE and would be safe for rapid discharge to early outpatient follow-up investigation (or could proceed more quickly to further inpatient investigations).

ADAPT

Accelerated Diagnostic Protocol to Assess Patients with Chest Pain Symptoms Using Contemporary Troponins

Table 1 The ADAPT ADP

All parameters had to be negative for the ADP to be considered negative and for the patient to be identified as low-risk

1. cTnI level at 0 and 2 h below institutional cutoff for an elevated troponin concentration
2. No new ischemic changes on the initial ECG
3. TIMI score = 0 (16)
   a. Age ≥65 yrs
   b. Three or more risk factors for coronary artery disease:
      (family history of coronary artery disease, hypertension, hypercholesterolaemia, diabetes, or being a current smoker)
   c. Use of aspirin in the past 7 days
   d. Significant coronary stenosis (e.g., previous coronary stenosis ≥50%)
   e. Severe angina (e.g., ≥2 angina events in past 24 h or persisting discomfort)
   f. ST-segment deviation of ≥0.05 mV on first ECG
   g. Increased troponin and/or creatine kinase-MB blood tests (during assessment*)

*The results of the 0-h cardiac troponin-I (cTnI) were used for calculation of the Thrombolysis In Myocardial Infarction (TIMI) score in this study, which is a modification from the original published score. This score parameter and that of ST-segment deviation are effectively redundant in the ADAPT accelerated diagnostic protocol (ADP) because of the broader cTnI and electrocardiographic (ECG) criteria (1 and 2).

2 saatlik hızlı tanı protokolü

Hess skoru
(North American Chest Pain Rule)

North American Chest Pain Rule*

A patient with chest pain and possible acute coronary syndrome can be safely discharged from the ED without additional diagnostic testing if NONE of the following four criteria are met:

(1) New ischemia on initial ECG†

(2) History of coronary artery disease

(3) Pain is typical for acute coronary syndrome‡

(4) Initial cardiac troponin is positive

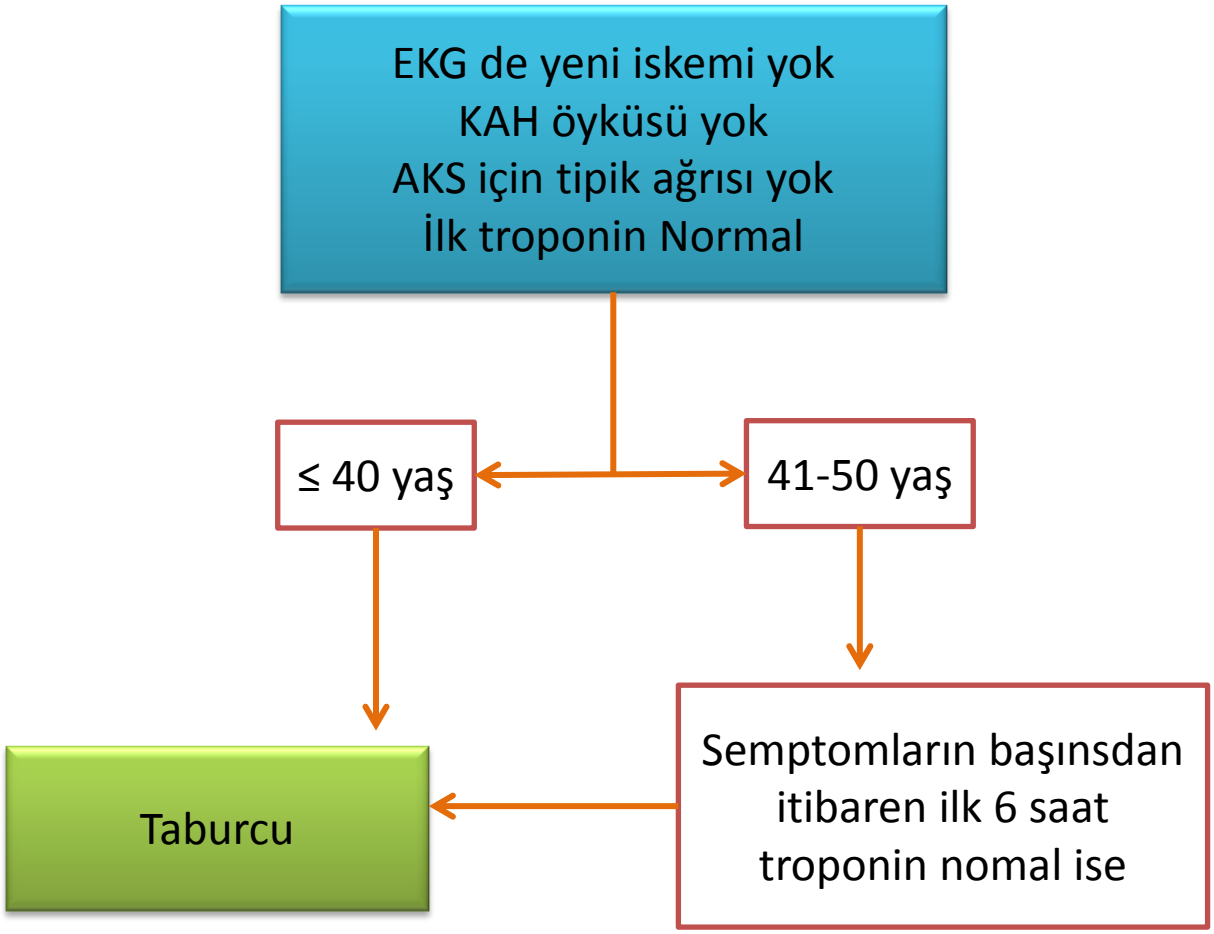
AND

(5) Age ≤ 40 years

OR

Age 41-50 years and repeat troponin at least 6 hours from symptom onset is negative.§

Hess skoru (North American Chest Pain Rule)



- Risk skorları arasında en çok kabul görenleri GRACE, TIMI ve HEART skorları

- En ideal risk skoru ????

		GOLD STANDART (Gerçek)		
Yeni Test (Tanı Testi)		Hastalık Var	Hastalık Yok	Toplam
	Pozitif	a	b	Toplam Pozitif (a+b)
	Negatif	c	d	Toplam Negatif (c+d)
	Toplam	Toplam Hasta (a+c)	Toplam Sağlam (b+d)	a+b+c+d

- Sensitivite (Duyarlılık): a / (a+c) x 100
- Pozitif Prediktif Değer (PPD): a / (a+b) x 100

- Spesifite (Özgüllük): d / (b+d) x 100
- Negatif Prediktif Değer (NPD): d / (d+c) x 100

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Comparison of the GRACE, HEART and TIMI score to predict major adverse cardiac events in chest pain patients at the emergency department

J.M. Poldervaart [a,*,1], M. Langedijk [b,1], B.E. Backus [c,1], I.M.C. Dekker [d,1], A.J. Six [e,1], P.A. Doevendans [f,1], A.W. Hoes [a,1], J.B. Reitsma [a,1]

Background: The performance of the GRACE, HEART and TIMI scores were compared in predicting the probability of major adverse cardiac events (MACE) in chest pain patients presenting at the emergency department (ED), in particular their ability to identify patients at low risk.

Methods: Chest pain patients presenting at the ED in nine Dutch hospitals were included. The primary outcome was MACE within 6 weeks. The HEART score was determined by the treating physician at the ED. The GRACE and TIMI score were calculated based on prospectively collected data. Performance of the scores was compared by calculating AUC curves. Additionally, the number of low-risk patients identified by each score were compared at a fixed level of safety of at least 95% or 98% sensitivity.

Results: In total, 1748 patients were included. The AUC of GRACE, HEART, and TIMI were 0.73 (95% CI: 0.70–0.76%), 0.86 (95% CI: 0.84–0.88%) and 0.80 (95% CI: 0.78–0.83%), respectively (all differences in AUC highly statistically significant). At an absolute level of safety of at least 98% sensitivity, the GRACE score identified 231 patients as "low risk" in which 2.2% a MACE was missed; the HEART score identified 381 patients as "low risk" with 0.8% missed MACE. The TIMI score identified no "low risk" patients at this safety level.

Conclusions: The HEART score outperformed the GRACE and TIMI scores in discriminating between those with and without MACE in chest pain patients, and identified the largest group of low-risk patients at the same level of safety.

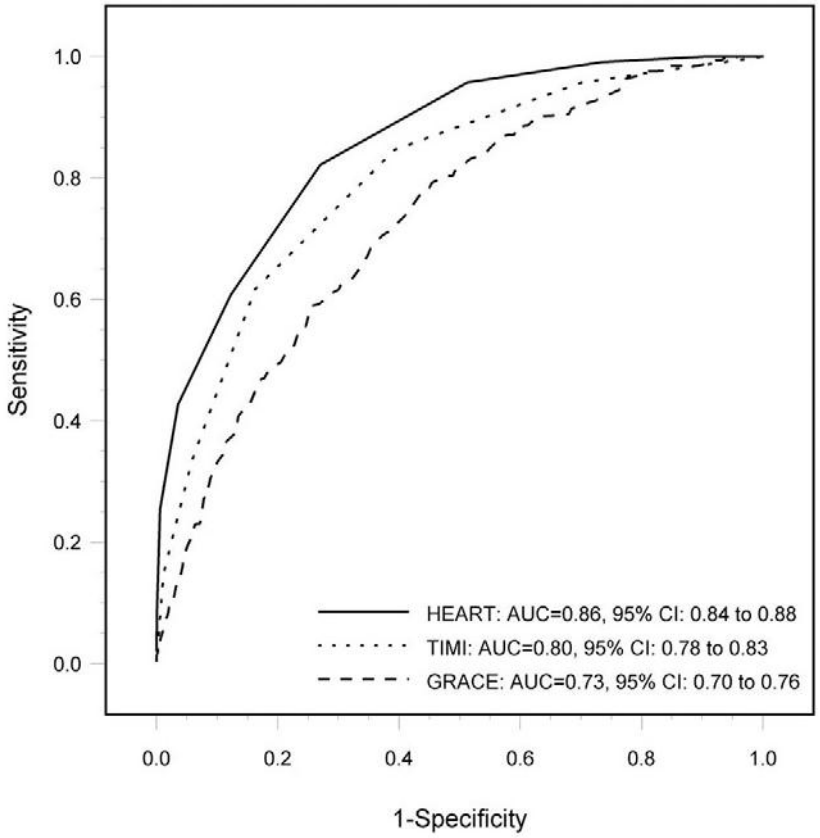

Fig. 2. Receiver-operating-characteristic (ROC) curves and corresponding Areas under the curve (AUCs) of the GRACE, HEART and TIMI score to predict major adverse cardiac events within 6 weeks.

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5. Conclusions

From our head-to-head comparison of the GRACE, HEART and TIMI score in a large prospective cohort of chest pain patients presenting to the ED, we conclude that the HEART score performed best in discriminating between those with and without MACE. The HEART score identified the largest number of patients (40.5%) as low risk without compromising safety. We recommend the use of the HEART score in the work-up of patients with chest pain at the ED.

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Observational Study

Medicine®

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Prognostic values of 4 risk scores in Chinese patients with chest pain

Prospective 2-centre cohort study

Xiao-Hui Chen, MD[a], Hui-Lin Jiang, MD[a], Yun-Mei Li, MPhil[a], Cangel Pui Yee Chan, PhD[b], Jun-Rong Mo, MD[a], Chao-Wei Tian, PhD[a], Pei-Yi Lin, MD[a], Colin A. Graham, MD, FRCEM[b], Timothy H. Rainer, MD, FRCEM[b,*]

Abstract

Four risk scores for stratifying patients with chest pain presenting to emergency departments (EDs) (namely Thrombolysis in myocardial infarction [TIMI], Global registry for acute coronary events [GRACE], Banach and HEART) have been developed in Western settings but have never been compared and validated in Chinese patients. We aimed to find out to the number of MACE within 7 days, 30 days, and 6 months after initial ED presentation, and also to compare the prognostic performance of these scores in Chinese patients with suspected cardiac chest pain (CCP) to predict 7-day, 30-day, and 6-month major adverse cardiac events (MACE).

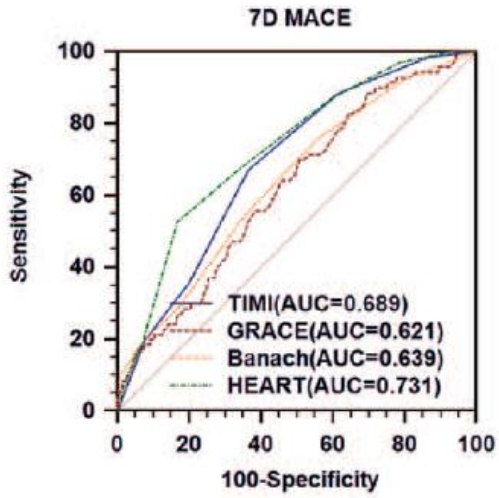
A prospective 2-center observational cohort study of consecutive patients presenting with chest pain to the EDs of 2 university hospitals in Guangdong and Hong Kong from 17 March 2012 to 14 August 2013 was conducted. Patients aged ≥18 years with suspected CCP but without ST-segment elevation myocardial infarction (STEMI) were recruited.

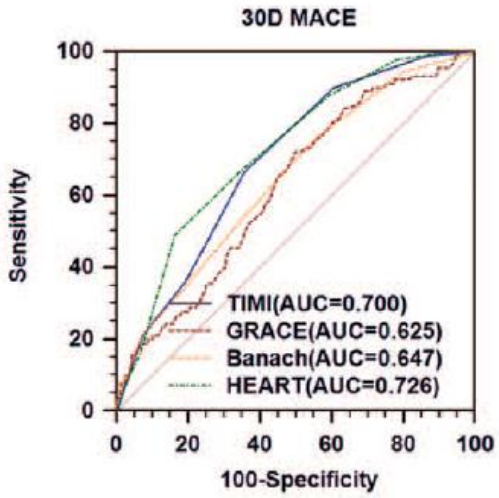
Of 833 enrolled patients (mean age 65.1 years, SD14.5; 55.6% males), 121 (14.5%) experienced MACE within 6 months (4.8% with safety outcomes and 10.3% with effectiveness outcomes). The HEART score had the largest area under the receiver operating characteristic (ROC) curve for predicting MACE at 7-day, 30-day, and 6-month follow-up [area under curve (AUC) = 0.731, 0.726, and 0.747, respectively. The HEART score also had the largest AUC for predicting effectiveness outcome (AUC = 0.715, 0.704, and 0.721, respectively). However, there was no significant difference in AUC between HEART and TIMI scores. Banach had the largest AUC for predicting safety outcome (AUC = 0.856, 0.837, and 0.850, respectively).

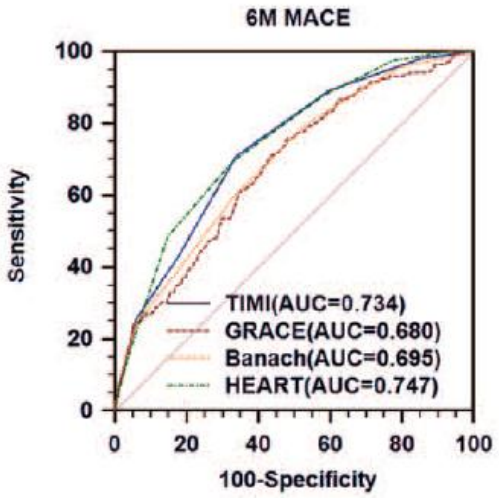
The HEART score performed better than the GRACE and Banach scores to predict total MACE and effectiveness outcome in Chinese patients with suspected CCP, whereas the Banach score best predicted safety outcomes.

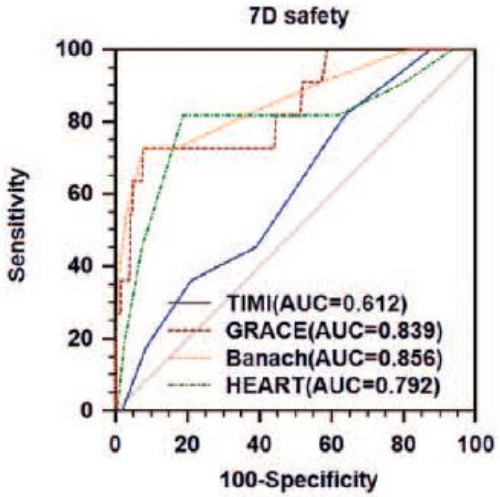
Abbreviations: ACS = acute coronary syndrome, CMS = clinical management system, cTnT = cardiac troponin T, ED = emergency department, GRACE = Global registry for acute coronary events, GZ = Guangzhou, HK = Hong Kong, IQR = interquartile range, MACE = major adverse cardiac events, NSTEMI = non-ST-elevation myocardial infarction, PCI = percutaneous coronary intervention, PWH = Prince of Wales Hospital, ROC = receiver operating characteristic, STEMI = ST-elevation myocardial infarction, TIMI = thrombolysis in myocardial infarction, US = United States.

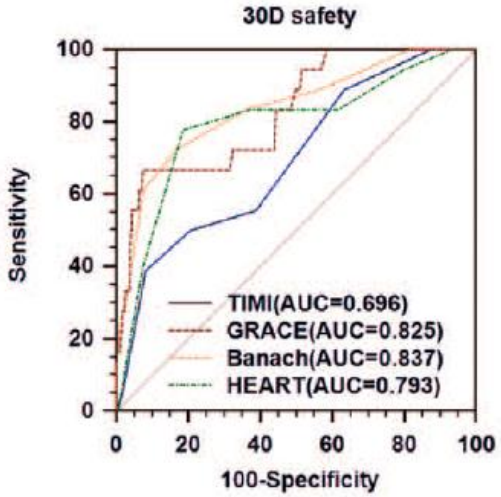
Keywords: Banach, cardiac, chest pain, Chinese, emergency department, Global registry for acute coronary event, HEART, MACE, predictive, prognostic, risk stratification, score, thrombolysis in myocardial infarction

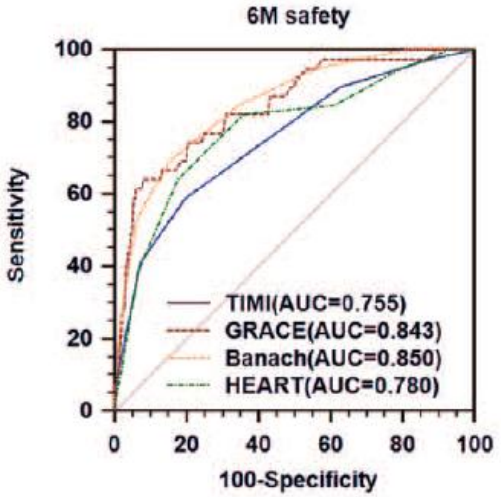

7D MACE
Sensitivity
100-Specificity
0
20
40
60
80
100
TIMI(AUC=0.689)
GRACE(AUC=0.621)
Banach(AUC=0.639)
HEART(AUC=0.731)


30D MACE
Sensitivity
100-Specificity
0
20
40
60
80
100
TIMI(AUC=0.700)
GRACE(AUC=0.625)
Banach(AUC=0.647)
HEART(AUC=0.726)


6M MACE
Sensitivity
100-Specificity
0
20
40
60
80
100
TIMI(AUC=0.734)
GRACE(AUC=0.680)
Banach(AUC=0.695)
HEART(AUC=0.747)

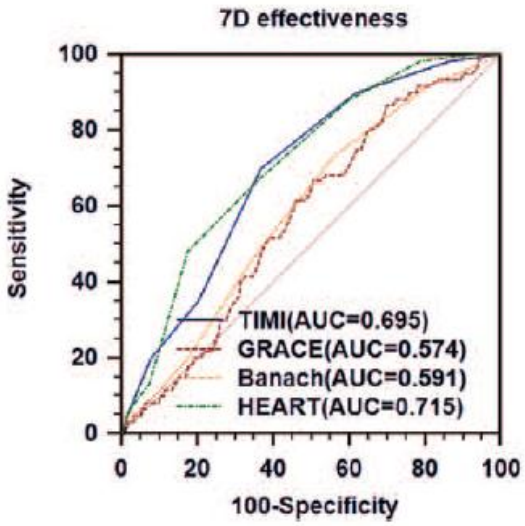


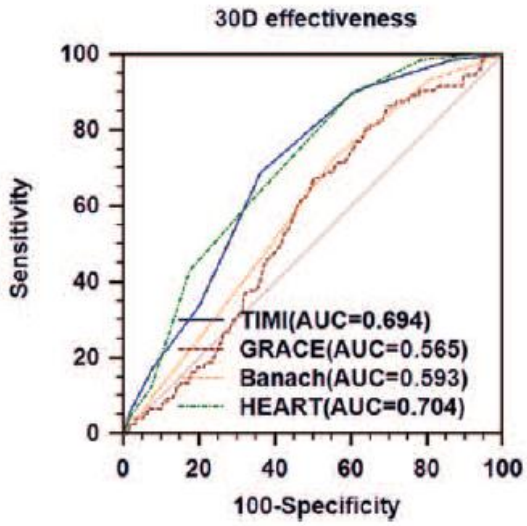


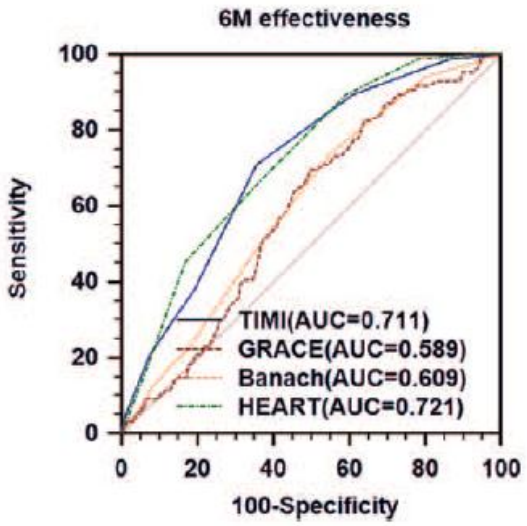


2.7. Definitions

MACE is defined as a composite of safety and effectiveness outcomes. Safety outcomes include all-cause mortality (including cardiac death and sudden cardiac death), cardiac arrest, readmission with myocardial infarction and cardiogenic shock. Effectiveness outcomes consist of coronary revascularization (including percutaneous coronary intervention and coronary artery bypass grafting), ventricular arrhythmia needing intervention and high-degree artioventricular block needing intervention (including percutaneous radiofrequency ablation and pacemaker implantation).[10] ACS is an umbrella term for a spectrum of







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		GOLD STANDART (Gerçek)		
Yeni Test (Tanı Testi)		Hastalık Var	Hastalık Yok	Toplam
	Pozitif	a	b	Toplam Pozitif (a+b)
	Negatif	c	d	Toplam Negatif (c+d)
	Toplam	Toplam Hasta (a+c)	Toplam Sağlam (b+d)	a+b+c+d

- Sensitivite (Duyarlılık): a / (a+c) x 100
- Pozitif Prediktif Değer (PPD): a / (a+b) x 100

- Spesifite (Özgüllük): d / (b+d) x 100
- Negatif Prediktif Değer (NPD): d / (d+c) x 100

Table 3

Prognostic performances of different risk scores for predicting 7-day, 30-day, and 6-month MACE.

	TIMI				GRACE				Banach				HEART			
	Cut-off	SN % (95%CI)	SP % (95%CI)	AUC (95%CI)	Cut-off	SN % (95%CI)	SP % (95%CI)	AUC (95%CI)	Cut-off	SN % (95%CI)	SP % (95%CI)	AUC (95%CI)	Cut-off	SN % (95%CI)	SP % (95%CI)	AUC (95%CI)
Total MACE																
7-day FU	>2	67.1 (54.9–77.9)	63.4 (59.9–66.9)	0.689 (0.656–0.720)*	>109	70.0 (57.9–80.4)	49.1 (45.5–52.8)	0.621 (0.587–0.654)	>0	75.7 (64.0–85.2)	44.3 (40.7–47.9)	0.639 (0.605–0.672)	>5	52.9 (40.6–64.9)	83.2 (80.4–85.8)	0.731 (0.699–0.761)§,
30-day FU	>2	66.7 (55.9–76.3)	64.2 (60.6–67.7)	0.700 (0.668–0.731)*	>109	72.2 (61.8–81.1)	49.9 (46.3–53.6)	0.625 (0.591–0.658)	>0	75.6 (65.4–84.0)	44.8 (41.2–48.5)	0.647 (0.614–0.680)	>5	48.9 (38.2–59.7)	83.7 (80.9–86.3)	0.726 (0.694–0.756)§,
6-month FU	>2	71.1 (62.1–79.0)	66.3 (62.7–69.8)	0.734 (0.702–0.764)*	>114	71.1 (62.1–79.0)	56.6 (52.9–60.3)	0.680 (0.647–0.712)	>0	80.2 (71.9–86.9)	46.5 (42.8–50.2)	0.695 (0.662–0.726)	>4	69.4 (60.4–77.5)	67.3 (63.7–70.7)	0.747 (0.716–0.776)§,
Safety outcomes																
7-day FU	>1	81.8 (48.2–97.7)	36.4 (33.1–39.8)	0.612 (0.578–0.645)*,†	>165	72.7 (39.0–94.0)	92.2 (89.6–93.5)	0.839 (0.812–0.863)	>3	72.7 (39.0–94.0)	92.1 (90.0–93.8)	0.856 (0.830–0.879)	>5	81.8 (48.2–97.7)	81.0 (78.2–83.6)	0.792 (0.763–0.819)‡
30-day FU	>4	38.9 (17.3–64.3)	91.8 (89.7–93.6)	0.696 (0.664–0.7b27)*,†	>165	66.7 (41.0–86.7)	92.6 (90.6–94.3)	0.825 (0.798–0.851)	>2	72.2 (46.5–90.3)	83.4 (80.7–85.9)	0.837 (0.811–0.862)	>5	77.8 (52.4–93.6)	81.5 (78.6–84.1)	0.793 (0.763–0.820)
6-month FU	>3	59.0 (42.1–74.4)	80.5 (77.5–83.2)	0.755 (0.724–0.784)†	>160	64.1 (47.2–78.8)	91.9 (89.8–93.7)	0.843 (0.816–0.867)	>2	69.2 (52.4–83.0)	84.8 (82.1–87.2)	0.850 (0.824–0.874)	>5	64.1 (47.2–78.8)	82.4 (79.5–85.0)	0.780 (0.750–0.808)
Effectiveness outcomes																
7-day FU	>2	70.0 (56.8–81.2)	63.3 (59.8–66.7)	0.695 (0.663–0.726)*,†	>91	86.7 (75.4–94.1)	29.9 (26.7–33.2)	0.574 (0.539–0.608)	>0	73.3 (60.3–83.9)	43.9 (40.3–47.4)	0.591 (0.557–0.625)	>4	66.7 (53.3–78.3)	64.2 (60.7–67.6)	0.715 (0.683–0.746)§,
30-day FU	>2	68.9 (57.1–79.2)	63.8 (60.2–67.2)	0.694 (0.661–0.725)*,†	>110	67.6 (55.7–78.0)	49.8 (46.2–53.4)	0.565 (0.530–0.599)	>0	73.0 (61.4–82.6)	44.1 (40.6–47.8)	0.593 (0.559–0.627)	>3	89.2 (79.8–95.2)	40.5 (36.9–44.0)	0.704 (0.672–0.735)§,
6-month FU	>2	70.9 (60.1–80.2)	64.5 (61.0–68.0)	0.711 (0.679–0.742)*,†	>110	69.8 (58.9–79.2)	50.3 (46.7–54.0)	0.589 (0.555–0.623)	>0	74.4 (63.9–83.2)	44.6 (41.0–48.2)	0.609 (0.575–0.643)	>3	89.5 (81.1–95.1)	41.0 (37.4–44.6)	0.721 (0.690–0.752)§,

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Prognostic values of 4 risk scores in Chinese patients with chest pain

Prospective 2-centre cohort study

Xiao-Hui Chen, MD[a], Hui-Lin Jiang, MD[a], Yun-Mei Li, MPhil[a], Cangel Pui Yee Chan, PhD[b], Jun-Rong Mo, MD[a], Chao-Wei Tian, PhD[a], Pei-Yi Lin, MD[a], Colin A. Graham, MD, FRCEM[b], Timothy H. Rainer, MD, FRCEM[b,*]

5. Conclusion

This study compared 4 independent risk scores in a large cohort of unselected ED patients with possible cardiac chest pain. The HEART score performed better than the GRACE and Banach scores for predicting total MACE and effectiveness outcomes, whereas the Banach score best predicted safety outcomes.

2.7. Definitions

MACE is defined as a composite of safety and effectiveness outcomes. Safety outcomes include all-cause mortality (including cardiac death and sudden cardiac death), cardiac arrest, readmission with myocardial infarction and cardiogenic shock. Effectiveness outcomes consist of coronary revascularization (including percutaneous coronary intervention and coronary artery bypass grafting), ventricular arrhythmia needing intervention and high-degree artioventricular block needing intervention (including percutaneous radiofrequency ablation and pacemaker implantation).[10] ACS is an umbrella term for a spectrum of

Identifying Patients Suitable for Discharge After a Single-Presentation High-Sensitivity Troponin Result: A Comparison of Five Established Risk Scores and Two High-Sensitivity Assays

Edward W. Carlton, MBChB*; Ahmed Khattab, PhD; Kim Greaves, MD

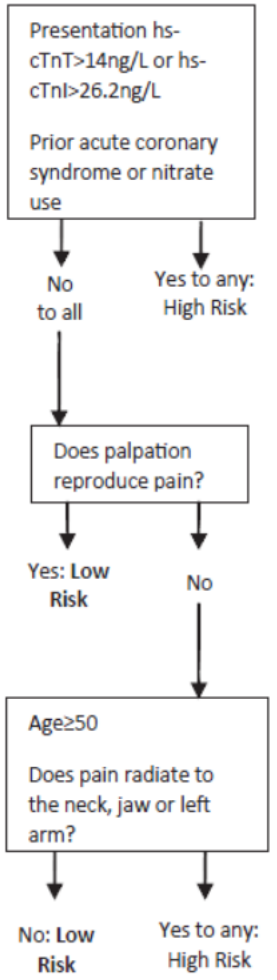
*Corresponding Author. E-mail: eddcarlton@gmail.com, Twitter: @eddcarlton.

Study objective: We compare the ability of 5 established risk scores to identify patients with suspected acute coronary syndromes who are suitable for discharge after a modified single-presentation high-sensitivity troponin result.

Taburculuğa uygun hastayı saptamak: 5 risk skoru ve hsTrop

- AKS şüphesi olan hastalarda bir kez hs-Tn görülüp taburcu edilmesi uygun olan hastaları belirleyebilmek amacıyla bu hastalarda 5 risk skoru karşılaştırılmış

1. Modifiye Goldman,
2. Thrombolysis in myocardial infarction (TIMI),
3. Global Registry of Acute Cardiac Events (GRACE),
4. History, ECG, Age, Risk factors, Troponin (HEART)
5. Vancouver Göğüs Ağrısı risk skorları

Risk Score	m-Goldman	TIMI	GRACE	HEART	Vancouver Chest Pain Rule
Clinical Variables	Typical new onset chest pain at rest Pain the same as previous myocardial infarction Pain not relieved by nitroglycerin within 15 minutes Pain lasting more than 60 minutes Pain occurring with increasing frequency Hypotension (Systolic BP <100mmHg) Acute shortness of breath Pain within 6 weeks of an myocardial infarction or revascularization	Age≥65 y ≥3 risk factors* for coronary artery disease Use of aspirin in last 7 days Significant coronary stenosis (>50%)† Recent severe angina (≥2 angina events in preceding 24h)	**Killip Class:** I: 0 points II: 20 III: 39 IV: 59 **Systolic BP, mmHg:** ≤80: 58 points 80-99: 53 100-119: 43 120-139: 34 140-159: 24 160-199: 10 ≥200: 0 **Heart Rate:** ≤50: 0 points 50-69: 3 70-89: 9 90-109: 15 110-149: 24 150-199: 38 ≥200: 46 **Age:** ≤30: 0 points 30-39: 8 40-49: 25 50-59: 41 60-69: 58 70-79: 75 **Creatinine Level (µmol/L):** ≤35: 1 point 36-70: 4	**History:** Highly suspicious: 2 Moderately suspicious: 1 Slightly suspicious: 0 **ECG:** Significant ST depression‡: 2 Non-specific repolarisation disturbance: 1 Normal: 0 **Age:** ≥65 years: 2 45-65 years: 1 <45 years: 0 **Risk Factors:** ≥3 Risk factors* for coronary artery disease: 2 1 or 2 risk factors: 1 No risk factors: 0 **Troponin:** **hs-cTnT:** ≥30ng/L§: 2 >14ng/L to <30ng/L§: 1 ≤14ng/L: 0 **hs-cTnI:**	

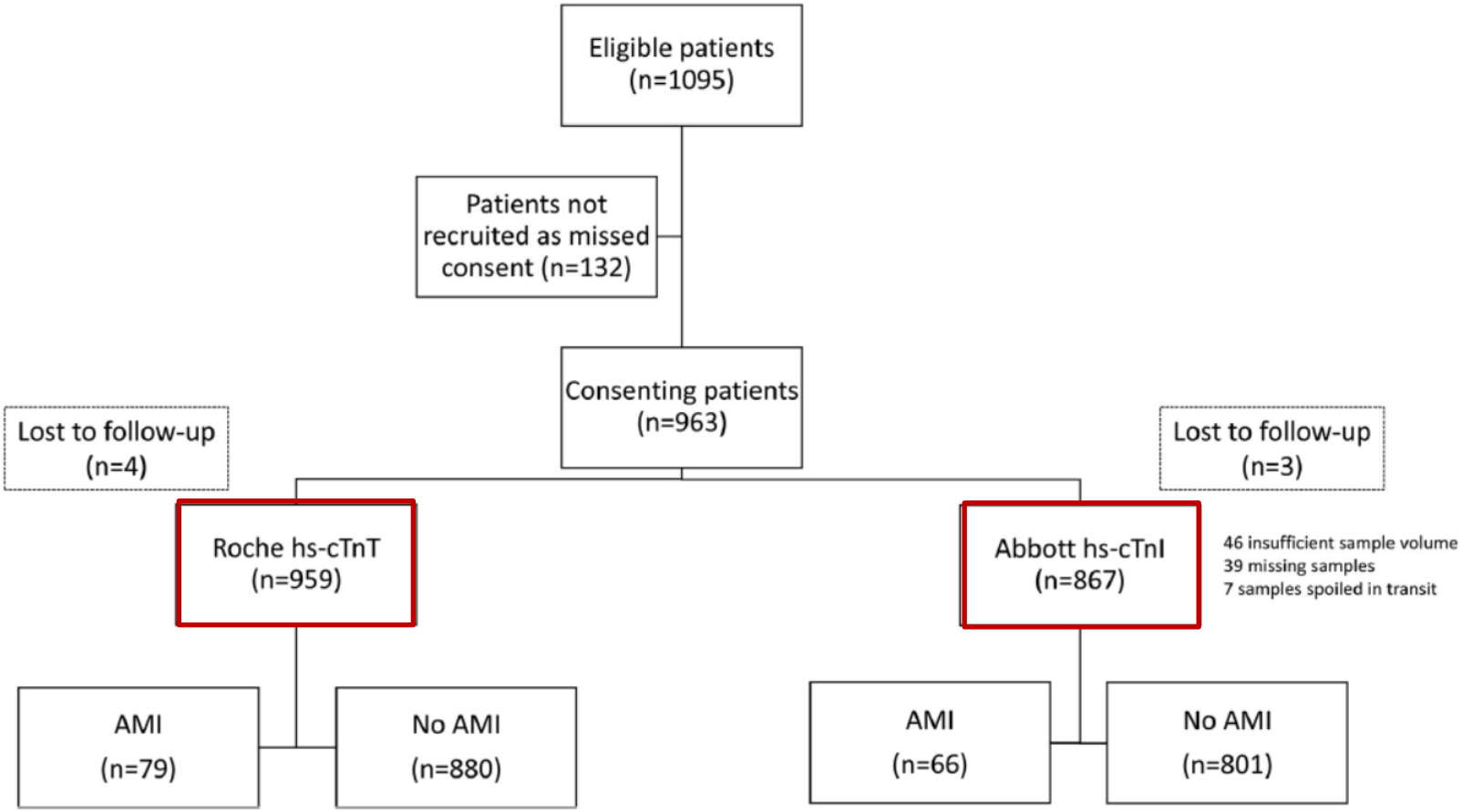


Figure 2. Recruitment flow chart. *AMI*, Acute myocardial infarction.

		GOLD STANDART (Gerçek)		
Yeni Test (Tanı Testi)		Hastalık Var	Hastalık Yok	Toplam
	Pozitif	a	b	Toplam Pozitif (a+b)
	Negatif	c	d	Toplam Negatif (c+d)
	Toplam	Toplam Hasta (a+c)	Toplam Sağlam (b+d)	a+b+c+d

- Sensitivite (Duyarlılık): a / (a+c) x 100
- Pozitif Prediktif Değer (PPD): a / (a+b) x 100

- Spesifite (Özgüllük): d / (b+d) x 100
- Negatif Prediktif Değer (NPD): d / (d+c) x 100

Table 2. Test performance of each risk score with high-sensitivity troponin T.

	hs-cTnT ≤14 ng/L Alone (99th Percentile)	m-Goldman Score 0 and hs-cTnT ≤14 ng/L	m-Goldman Score ≤1 and hs-cTnT ≤14 ng/L	TIMI Score 0 and hs-cTnT ≤14 ng/L	TIMI Score ≤1 and hs-cTnT ≤14 ng/L	GRACE Score <60 (Incorporates hs-cTnT)*	GRACE Score <80 (Incorporates hs-cTnT)*	HEART Score ≤2 (Incorporates hs-cTnT)	HEART Score ≤ 3 (Incorporates hs-cTnT)	Vancouver Chest Pain Rule (Incorporates hs-cTnT)
Sensitivity (95% CI)	83.5 (73.8–90.5)	98.7 (92.5–99.9)	98.7 (92.3–99.9)	100 (94.3–100)	94.9 (87.0–98.4)	100 (94.4–100)	92.3 (83.7–96.8)	98.7 (92.4–99.9)	93.7 (85.5–97.6)	100 (94.4–100)
Negative predictive value (95% CI)	98.3 (97.3–99.0)	99.0 (94.2–99.9)	99.7 (98.4–100)	100 (98.5–100)	99.2 (97.8–99.7)	100 (95.3–100)	98.0 (95.8–99.2)	99.2 (95.2–100)	98.3 (96.2–99.4)	100 (97.1–100)
Specificity (95% CI)	85.6 (84.7–86.2)	11.5 (10.9–11.6)	43.3 (42.7–43.4)	35.0 (34.5–35.0)	53.5 (52.8–53.8)	10.6 (10.1–10.6)	33.8 (33.0–34.2)	14.1 (13.5–14.2)	33.9 (33.1–34.2)	17.5 (17.0–17.5)
Positive predictive value (95% CI)	34.2 (30.2–37.0)	9.1 (8.5–9.2)	13.5 (12.6–13.7)	12.1 (11.4–12.1)	15.5 (14.2–16.1)	9.1 (8.6–9.1)	11.1 (10.0–11.6)	9.4 (8.8–9.5)	11.3 (10.3–11.8)	9.8 (6.4–9.8)
Positive likelihood ratio (95% CI)	5.789 (4.822–6.549)	1.115 (1.038–1.130)	1.741 (1.611–1.766)	1.538 (1.440–1.538)	2.043 (1.845–2.130)	1.119 (1.050–1.119)	1.393 (1.249–1.470)	1.149 (1.069–1.165)	1.416 (1.278–1.484)	1.212 (1.137–1.212)
Negative likelihood ratio (95% CI)	0.192 (0.111–0.309)	0.110 (0.006–0.691)	0.029 (0.002–0.180)	0 (0–0.165)	0.095 (0.030–0.245)	0 (0–0.555)	0.228 (0.093–0.495)	0.090 (0.005–0.561)	0.187 (0.069–0.439)	0 (0–0.331)
% Identified as suitable for discharge (95% CI)	79.9 (77.2–82.3)	10.6 (8.8–12.8)	39.8 (36.7–43.0)	32.1 (29.2–35.2)	49.1 (45.9–52.3)	9.8 (8.0–11.9)	31.6 (28.7–34.7)	13.0 (11.0–15.4)	31.6 (28.7–34.7)	16.0 (13.8–18.6)
Number of AMIs in patients identified as suitable for discharge (%)	13/766 (1.7)	1/102 (1.0)	1/382 (0.3)	0/308	4/471 (0.9)	0/93	6/301 (2.0)	1/125 (0.8)	5/303 (1.7)	0/154

Table 3. Test performance of each risk score with high-sensitivity troponin I.

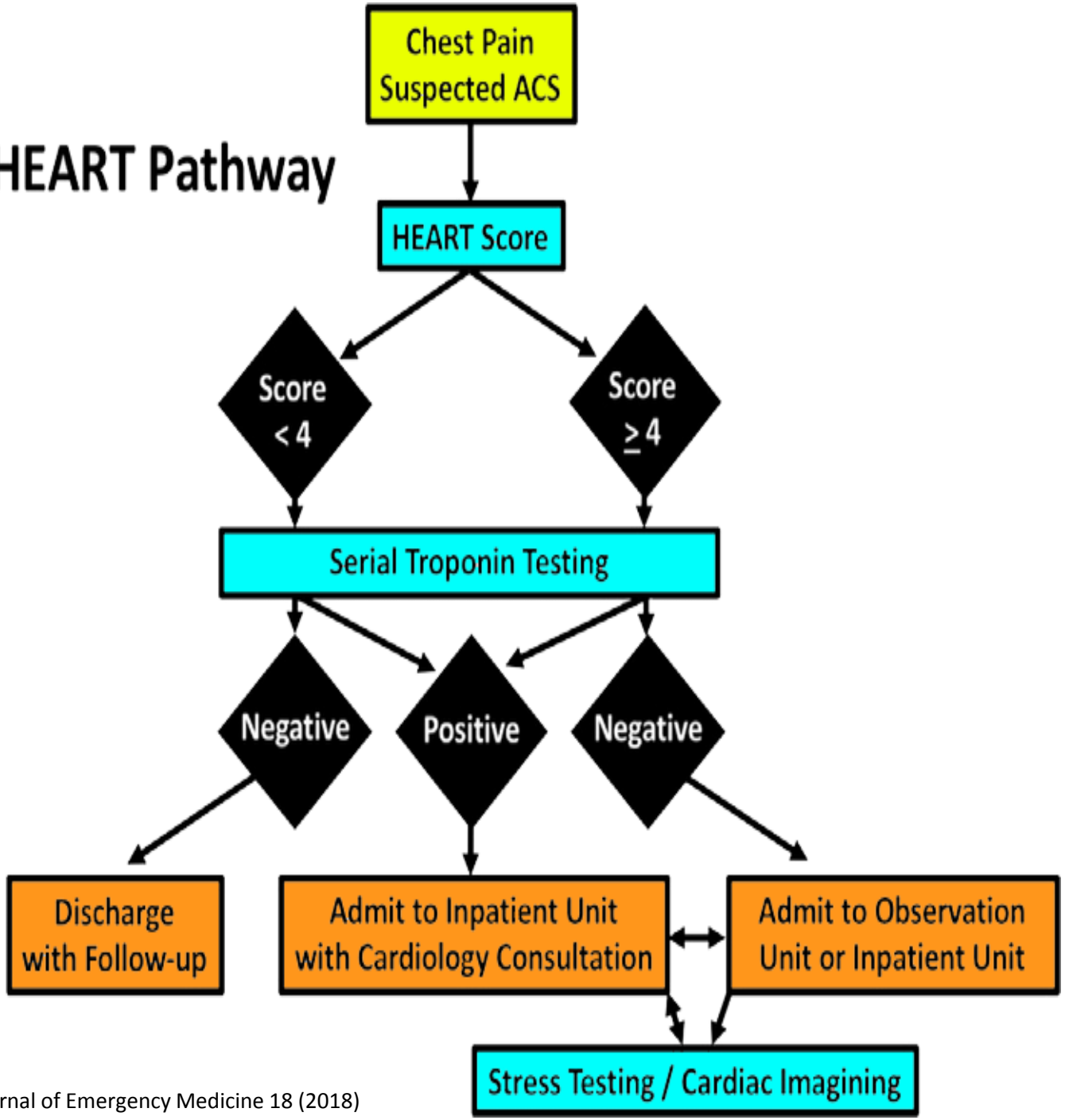
	hs-cTnI ≤26.2 ng/L Alone (99th Percentile)	m-Goldman Score 0 and hs-cTnI ≤26.2 ng/L	m-Goldman Score ≤1 and hs-cTnI ≤26.2 ng/L	TIMI Score 0 and hs-cTnI ≤26.2 ng/L	TIMI Score ≤1 and hs-cTnI ≤26.2 ng/L	GRACE Score <60 (Incorporates hs-cTnI)*	GRACE Score <80 (Incorporates hs-cTnI)*	HEART Score ≤2 (Incorporates hs-cTnI)	HEART Score ≤ 3 (Incorporates hs-cTnI)	Vancouver Chest Pain Rule (Incorporates hs-cTnI)
Sensitivity (95% CI)	62.1 (51.9–70.8)	98.5 (91.0–99.9)	92.8 (82.8–97.2)	95.5 (86.7–98.8)	87.9 (77.3–94.2)	98.5 (91.1–99.9)	89.4 (79.1–95.2)	98.5 (91.0–99.9)	97.0 (88.7–99.5)	100 (93.3–100)
Negative predictive value (95% CI)	96.9 (96.1–97.6)	99.0 (94.2–99.9)	98.7 (97.0–99.5)	99.0 (96.9–99.7)	98.3 (96.8–99.2)	98.9 (93.4–99.9)	97.5 (95.1–98.9)	99.1 (94.8–100)	99.3 (97.3–99.9)	100 (96.7–100)
Specificity (95% CI)	97.2 (96.5–98.1)	12.6 (12.0–12.7)	47.4 (46.6–47.8)	35.6 (34.9–35.9)	56.7 (55.8–57.2)	11.1 (10.5–11.2)	34.3 (33.5–34.8)	14.1 (13.5–14.2)	34.7 (34.0–34.9)	16.7 (16.2–16.7)
Positive predictive value (95% CI)	66.1 (55.2–75.4)	8.5 (7.9–8.6)	12.7 (11.3–13.3)	10.9 (9.9–11.3)	14.3 (12.6–15.4)	8.4 (7.8–8.5)	10.2 (9.0–10.8)	8.6 (8.0–8.8)	10.9 (10.0–11.2)	9.0 (8.4–9.0)
Positive likelihood ratio (95% CI)	23.695 (14.969–37.161)	1.127 (1.035–1.145)	1.758 (1.551–1.863)	1.482 (1.330–1.541)	2.029 (1.749–2.201)	1.107 (1.017–1.125)	1.361 (1.190–1.461)	1.147 (1.052–1.165)	1.485 (1.345–1.528)	1.201 (1.114–1.201)
Negative likelihood ratio (95% CI)	0.389 (0.298–0.498)	0.120 (0.006–0.746)	0.160 (0.059–0.370)	0.128 (0.033–0.383)	0.214 (0.101–0.407)	0.137 (0.007–0.852)	0.309 (0.137–0.624)	0.107 (0.006–0.665)	0.087 (0.015–0.332)	0 (0–0.412)
% Identified as suitable for discharge (95% CI)	92.8 (90.9–94.4)	11.8 (9.7–14.1)	44.4 (41.1–47.8)	33.2 (30.1–36.5)	52.4 (49.0–55.7)	10.3 (8.4–12.6)	32.5 (29.4–35.8)	13.1 (11.0–15.6)	32.2 (29.2–35.5)	15.4 (13.2–18.1)
Number of AMIs in patients identified as suitable for discharge (%)	25/805 (3.1)	1/102 (1.0)	5/385 (1.3)	3/288 (1.0)	8/454 (1.8)	1/89 (1.1)	7/280 (2.5)	1/114 (0.9)	2/280 (0.7)	0/134

- **Düşük riskli NSTE-AKS'de risk skorlamaları ile taburculuk kararı vermek, hastayı klinik ve Troponin sonucuyla birlikte değerlendirdiğimizde kolay, fakat x risk skoru diğerlerine daha üstündür demek oldukça zor.**

- Risk skorlarından prospektif validasyonu yapılmış olanlar TIMI, GRACE ve HEART skorları..

- Bu araştırmanın sonuçlarına dayanarak herhangi bir risk skorunu seçip, sadece onunla hastayı yönetmeye çalışmaktansa, **risk değerlendirmemize TIMI, GRACE veya HEART skorlarından birini dahil etmek akılcı olabilir**

The HEART Pathway



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HEART

History (Anamnesis)	Highly suspicious	2	
	Moderately suspicious	1	
	Slightly suspicious	0	
ECG	Significant ST-deviation	2	
	Non-specific repolarisation disturbance / LBBB / PM	1	
	Normal	0	
Age	≥ 65 years	2	
	45 – 65 years	1	
	≤ 45 years	0	
Risk factors	≥ 3 risk factors *or* history of atherosclerotic disease	2	
	1 or 2 risk factors	1	
	No risk factors known	0	
Troponin	≥ 3x normal limit	2	
	1-3x normal limit	1	
	≤ normal limit	0	
		Total	

Risk factors for atherosclerotic disease:

Hypercholesterolemia	Cigarette smoking
Hypertension	Positive family history
Diabetes Mellitus	Obesity (BMI>30)

TEŞEKKÜRLER

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