DÜŞÜK RİSKLİ GÖĞÜS AĞRILARINDA RİSKİ NASIL AZALTABİLİRİZ?

Dr. Evrim GÜL

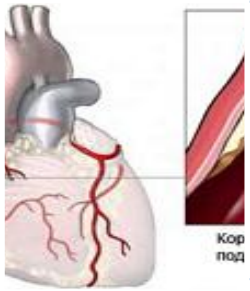
F.Ü Tıp Fak. Acil Tıp AD

- Giriş
- Epidemiyoloji
- Akut koroner sendrom sınıflama
- Risk sınıflamaları
- Objektif kardiyak testler

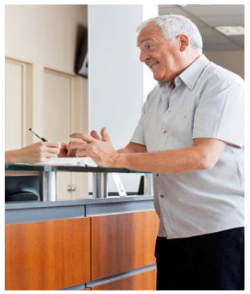
Sunum Planı

Giriş

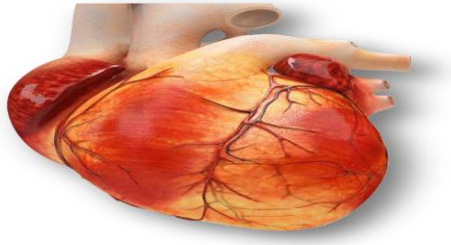
> 6 milyon/yılda hasta göğüs ağrısı



% 12-15 AKS



Yanlış tanı sonucu taburcu edilme %2-4



AKUT KORONER SENDROM

- “Akut koroner sendrom”(AKS) terimi, miyokard iskemisi veya enfarktüsü kanıtı bulunan hastalar için kullanılır.

  Üç tip AKS vardır:

✓ ST yükselmeli miyokard enfarktüsü,

✓ ST yükselmesi olmayan miyokard infarktüsü

✓ Unstable angına pektoris (USAP).

- AKS zamanında karar vermek, AKS hastalarına erken müdahalenin daha iyi sonuçlara yol açtığı kanıtlandığı için yüksek bir önceliktir.
- Tersine, AKS olmayan hastalar da AKS ayırıcı tanısı için zaman ve kaynak harcanmaması önemlidir.
- Benzer şekilde, acil servise göğüs ağrısı ile başvuran hastalarda travma, pulmoner emboli veya aort diseksiyonu gibi acil dikkat gerektiren başka bir nedenlerde olabilir.

Düşük Riskli Göğüs Ağrısı

- ACC / AHA'ya göre;

  -Normal veya "**normale yakın**" bir EKG

  -Kalp enzimleri

  -Kalp ritmi

  -Hemodinamisi normal olan **göğüs ağrılı** hastalardır.

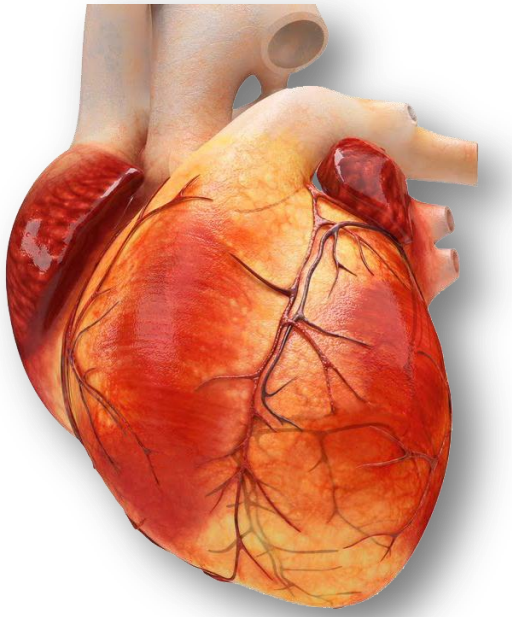
Düşük Olasılıklı AKS

AKS için kriterleri karşılamayan daha fazla değerlendirme gerektiren hastalar

Göğüs ağrılı hastaların %5-15 inde AKS

Acil servisten taburcu edilme oranları yaklaşık % 4

FM, EKG ve enzim tek başına bu hastalarda AKS dışlamada yeterli değildir.



Başlangıçta hastaneye yatırılan hastalara göre…

–Daha kötü klinik sonlanım

–Daha yüksek mortalite

Tanısal Yaklaşım

- Hikaye
- Fizik Muayane
- EKG
- Kardiyak enzimler
- Risk belirleme
- Non – invaziv görüntüleme
  - ✓Ekokardiografi
  - ✓Miyokardiyal perfüzyon görüntüleme
  - ✓Koroner BT anjiografi
- İnvaziv görüntüleme
  - Koroner anjiografi

Sınıflama

Tablo 2. Belirti ve bulguların KAH'ye sekonder AKS'yi gösterme olasılığı.

Özellik	Yüksek Olasılık *Aşağıdakilerden herhangi biri*	Orta Olasılık *Yüksek olasılık özelliklerinin yokluğu ve aşağıdakilerden herhangi birinin varlığı*	Düşük Olasılık *Yüksek ya da orta olasılık özelliklerinin yokluğu fakat aşağıdakilerden biri olabilir*
Öykü	Ana semptom olarak göğüs veya sol kol ağrısı ya da rahatsızlığı şeklinde daha önceden belgelenmiş anjinanın yeniden ortaya çıkması; MI dahil bilinen KAH öyküsü	Ana semptom olarak göğüs veya sol kol ağrısı ya da rahatsızlığı; Yaş>70, erkek cinsiyet, DM	Herhangi bir orta olasılık kriterinin yokluğunda olası iskemik semptomlar; yakın zamanda kokain kullanımı
Muayene	Geçici Mitral yetersizlik üfürümü, hipotansiyon, terleme, pulmoner ödem veya raller	Ekstrakardiyak (kalp dışı) damar hastalığı	Çarpıntı ile ortaya çıkan göğüs rahatsızlığı
EKG	Yeni ya da muhtemelen yeni geçici ST segment sapması (1 mm ve üzerinde) Veya birden çok göğüs derivasyonunda T dalga inversiyonu	Oturmuş (sabit) Q dalgası 0,5-1 mm ST çökmesi (depresyonu) veya >1 mm T dalga inversiyonu	Normal EKG, dominant R dalgalarının olduğu derivasyonlarda 1 mm'nin altında T dalga düzleşmesi veya inversiyonu
Kardiyak Belirteçler	Artmış kardiyak TnI, TnT veya CK-MB	Normal	Normal

KAH koroner arter hastalığını belirtir; CK-MB, kreatin kinazın MB fraksiyonu; EKG, elektrokardiyogram; MI, miyokart enfarktüsü; MY, mitral yetersizlik; TnI: troponin I; ve TnT: troponin T.

Braunwald E ve ark.'dan modifiye edilmiştir. Kararsız Anjina: Tanı ve Yönetim. 1994;3-1-AHCPR Yayın No 94-0602:1-154. Kamu malı.[127]

Kardiyopulmoner Resüsitasyon ve Acil Kardiyovasküler Bakım için **2010 AHA Kılavuzu**

Sınıflama

Düşük riskli AKS

- ❖ Olumsuz olaylar için düşük risk.
- ❖ Aşağıdakilerden hepsinin olması gerekir
- ✓ İskemik hikayenin olmaması
- ✓ EKG' nin normal, eskiyle aynı veya özgün olmayan değişiklikler
- ✓ Negatif kardiyak enzim

- ❖ veya aşağıdakilerden tümü olmalıdır
- ✓ 2 haftadan uzun süren değişmeyen belirtiler
- ✓ Egzersizle ağrı eşiğinde sadece hafif değişikler olan uzun süreli belirtiler
- ✓ EKG' nin normal, eskiyle aynı veya özgün olmayan değişiklikler
- ✓ Negatif kardiyak enzim

Tintinali's. Emergency Medicine 8. edition

Emerg Med
Clin N Am 28
(2010) 183–201

Pitfalls in Evaluating the Low-Risk Chest Pain Patient

Ian D. Jones, MD[a,b,c,*], Corey M. Slovis, MD[a,d,e]

KEYWORDS

- Acute coronary syndrome • Atypical chest pain
- Chest pain in the elderly • Electrocardiogram
- Low-risk chest pain • Risk stratification

Kardiyak İskemik Hastaların Uygunsuz Şekilde Taburculuğuna Yol Açan Etkenler

- Genç hasta
- Atipik semptomlar
- Kadın cinsiyet
- Tecrübesiz doktor
- Siyah ırk
- Acil servis şartlarının yetersiz olması
- Acil servis kalabalığı
- Başvuru EKG'sindeki iskemiyi saptamada yetersizlik
- Seri EKG sağlamada yetersizlik

MACE (majör olumsuz kardiyak sonuç)

Ölüm

Nonfatal MI

Revaskülarizasyon

Hastane dışı kardiyak arrest

Klasik veya geleneksel risk faktörleri	Geleneksel olmayan risk faktörleri
• İleri yaş • Erkek cinsiyet • HT • DM • Hiperkolesterolemi • Akrabalarında KAH • Sigara	• HIV • SLE • Son dönem böbrek hast. • Kokain • A tipi kişilik • Genetik veya kazanılmış trombofililer

Acil serviste AKS için kardiyak riski öngörmede yetersiz.

Risk Skorları

TIMI risk skoru

Grace risk skoru

Vancouver göğüs ağrısı kuralı

Hess skoru (North American Chest Pain Rule)

Heart skoru

TIMI Risk Skoru

Yaş ≥ 65

KAH için ≥3 risk faktörü

Bilinen KAH (Koroner stenoz ≥ 50)

0.5 mm ≥ ST segment sapması

Ciddi anjinal semptomlar (24 saat içinde 2 den fazla)

Son 7 günde aspirin kullanımı

Artmış kardiyak enzimler

Table 3. 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

*The TIMI risk score is determined by the sum of the presence of 7 variables at admission; 1 point is given for each of the following variables: ≥65 y of age; ≥3 risk factors for CAD; prior coronary stenosis ≥50%; ST deviation on ECG; ≥2 anginal events in prior 24 h; use of aspirin in prior 7 d; and elevated cardiac biomarkers.

TIMI Risk Skoru

- Yüksek olasılıklı hastalarda **iyi bir skordur.**
- TIMI 0 olan hastalarda 30 günlük **major iskemik komplikasyon** oranı 1.7-2.1
- Düşük olasılıklı hastalarda **ileri tanı testleri yoksa** duyarlı değildir.
- Avantajları:
  - ✓Basitliği
  - ✓Bilgisayar algoritmasına ihtiyaç duymaması
  - ✓Kısa vadeli (30 gün) sonuç riskini tahmin etme

Emerg Med Clin N Am 28 (2010) 183–201

Hızlandırılmış Tanı Protokolü

TIMI risk skoru 0

EKG normal

Troponin I normal (0 ve 2. saat)

1.975 hasta

- **392 (%20) düşük risk**
- **1 (%0.25) MACE**

✓ **Duyarlılık %99.7, Özgüllük %23.4**

2-Hour accelerated diagnostic protocol to assess patients with chest pain symptoms using contemporary troponins as the only biomarker: the ADAPT trial. J Am Coll Cardiol. 2012 Jun 5;59(23):2091-8.

Hızlandırılmış Tanı Protokolü

TIMI risk skoru **0**

EKG **Normal**

CK-MB, Troponin **N** (0 ve 2. h)

Toplam 3582 hasta (9 ülke, 14 Acil servis, >18 yaş ve en az 5 dk ağrı)

- ✓352 (%9.8) düşük risk
- ✓3 (%0.9) MACE

- ❖Duyarlılık % 99.3, NPD % 99.1
- ❖Özgüllük % 11, PPD % 12.9

A 2-h diagnostic protocol to assess patients with chest pain symptoms in the Asia-Pacific region (ASPECT): a prospective observational validation study. Published:March 23, 2011DOI:https://doi.org/10.1016/S0140-6736(11)60310-3

VANCOUVER SKORU

Vancouver skoru; EKG, kardiyak hikaye, nitrat kullanımı, yaş, ağrı karakteri, 2. saat troponin seviyesi

Yeni Vancouver Skoru:

- **2. saatte anormal EKG veya pozitif troponin yada AKS öncesinde nitrat kullanımı var mı?**
  - *Biri evet* ise erken taburculuk **düşünülmez**.

VANCOUVER SKORU

- **Palpasyon ile ağrı artıyor mu?**
  - *Evet* ise **erken taburcu edilebilir.**

- **Yaş ≥50, veya ağrı boyun, çene, ya da sol kola yayılıyor mu?**
  - Eğer *evet* ise **erken taburculuk düşünülmez**.

Yukarıdaki tüm sorulara cevap **hayır** ise, provokatif testler yakın tarihte önerilerek **hasta erken taburcu edilebil**ir.

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Original Contribution

The new Vancouver Chest Pain Rule using troponin as the only biomarker: an external validation study ☆

Louise Cullen, MBBS [a,b,c,*,1], Jaimi H. Greenslade, PhD [a,b,c,1], Martin Than, MBBS [d], Anthony F.T. Brown, MBChB [a,c], Christopher J. Hammett, MBChB [c,e], Arvin Lamanna, MBBS [e], Dylan F. Flaws, MBBS [a,c], Kevin Chu, MBBS [a,c], Lindsay F. Fowles, PhD [a], William A. Parsonage, DM [c,e]

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[b] School of Public Health, Queensland University of Technology, Brisbane, Australia
[c] School of Medicine, The University of Queensland, Brisbane, Australia
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ARTICLE INFO

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ABSTRACT

Objectives: To externally evaluate the accuracy of the new Vancouver Chest Pain Rule and to assess the diagnostic accuracy using either sensitive or highly sensitive troponin assays.
Methods: Prospectively collected data from 2 emergency departments (EDs) in Australia and New Zealand were analysed. Based on the new Vancouver Chest Pain Rule, low-risk patients were identified using electrocardiogram results, cardiac history, nitrate use, age, pain characteristics and troponin results at 2 hours after presentation. The primary outcome was 30-day diagnosis of acute coronary syndrome (ACS), including acute myocardial infarction, and unstable angina. Sensitivity, specificity, positive predictive values and negative predictive values were calculated to assess the accuracy of the new Vancouver Chest Pain Rule using either sensitive or highly sensitive troponin assay results.
Results: Of the 1635 patients, 20.4% had an ACS diagnosis at 30 days. Using the highly sensitive troponin assay, 212 (13.0%) patients were eligible for early discharge with 3 patients (1.4%) diagnosed with ACS. Sensitivity was 99.1% (95% CI 97.4–99.7), specificity was 16.1 (95% CI 14.2–18.2), positive predictive values was 23.3 (95% CI 21.1–25.5) and negative predictive values was 98.6 (95% CI 95.9–99.5). The diagnostic accuracy of the rule was similar using the sensitive troponin assay.
Conclusions: The new Vancouver Chest Pain Rule should be used for the identification of low risk patients presenting to EDs with symptoms of possible ACS, and will reduce the proportion of patients requiring lengthy assessment; however we recommend further outpatient investigation for coronary artery disease in patients identified as low risk.

Conclusions: The new Vancouver Chest Pain Rule should be used for the identification of low risk patients presenting to EDs with symptoms of possible ACS, and will reduce the proportion of patients requiring lengthy assessment; however we recommend further outpatient investigation for coronary artery disease in patients identified as low risk.

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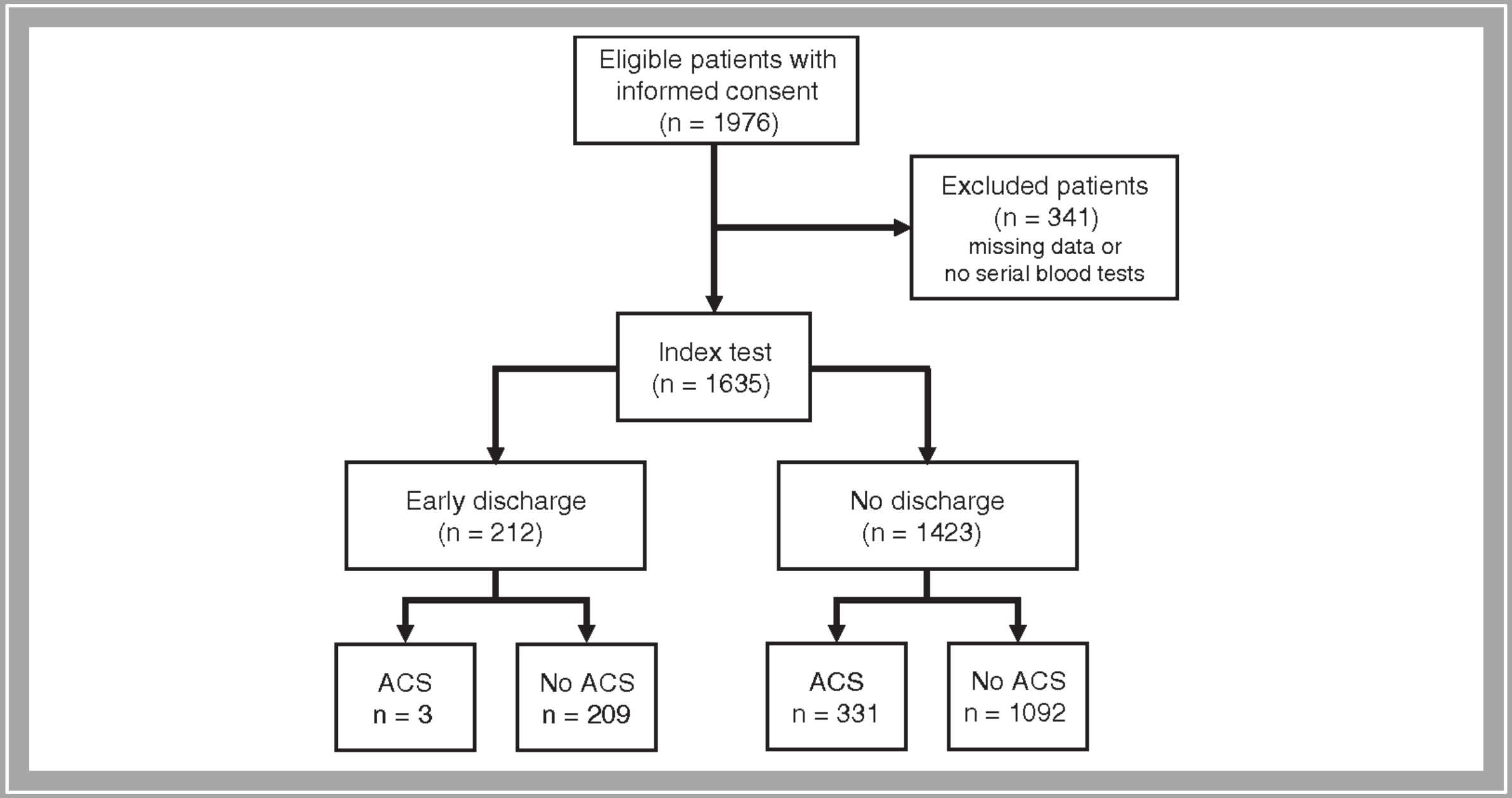
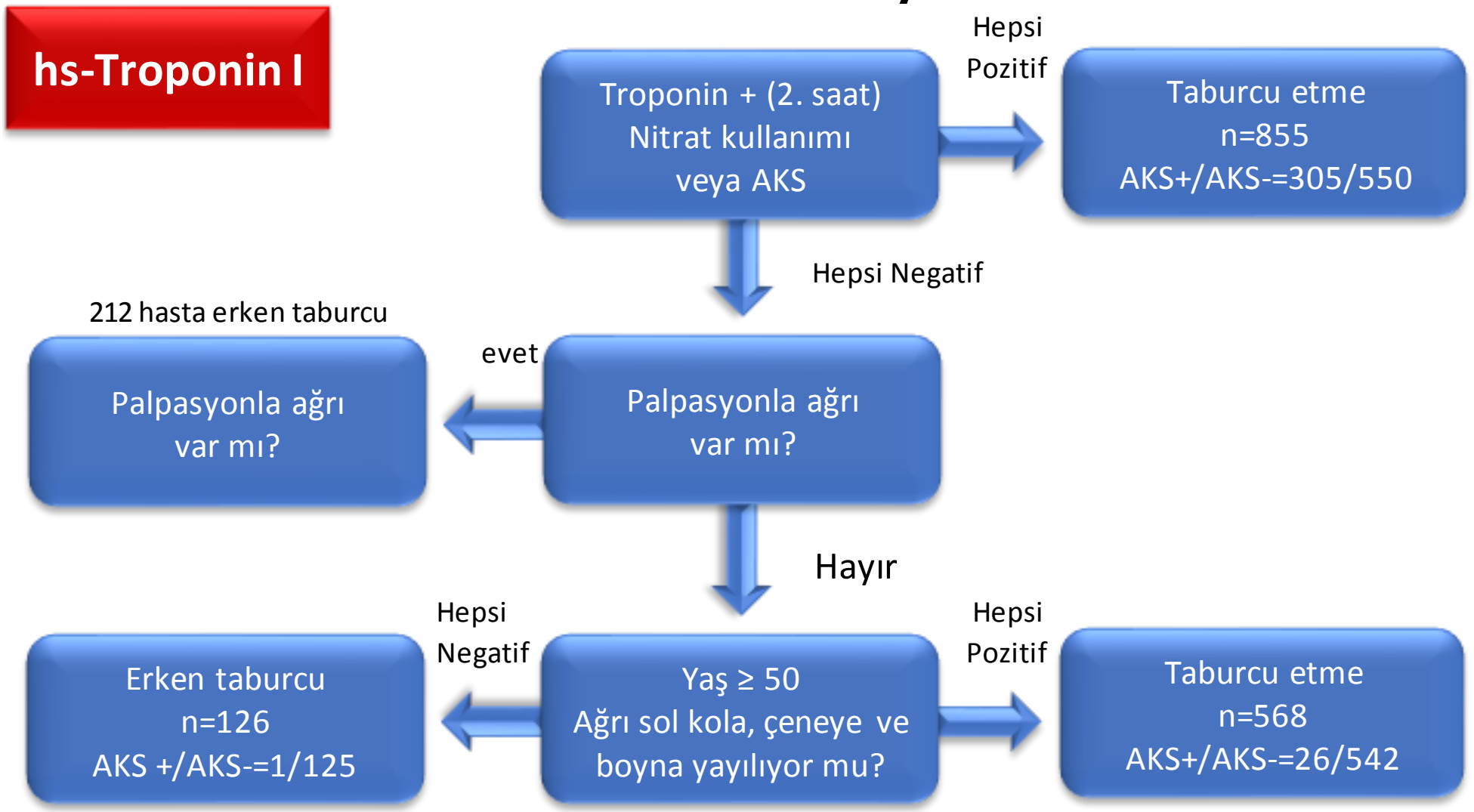


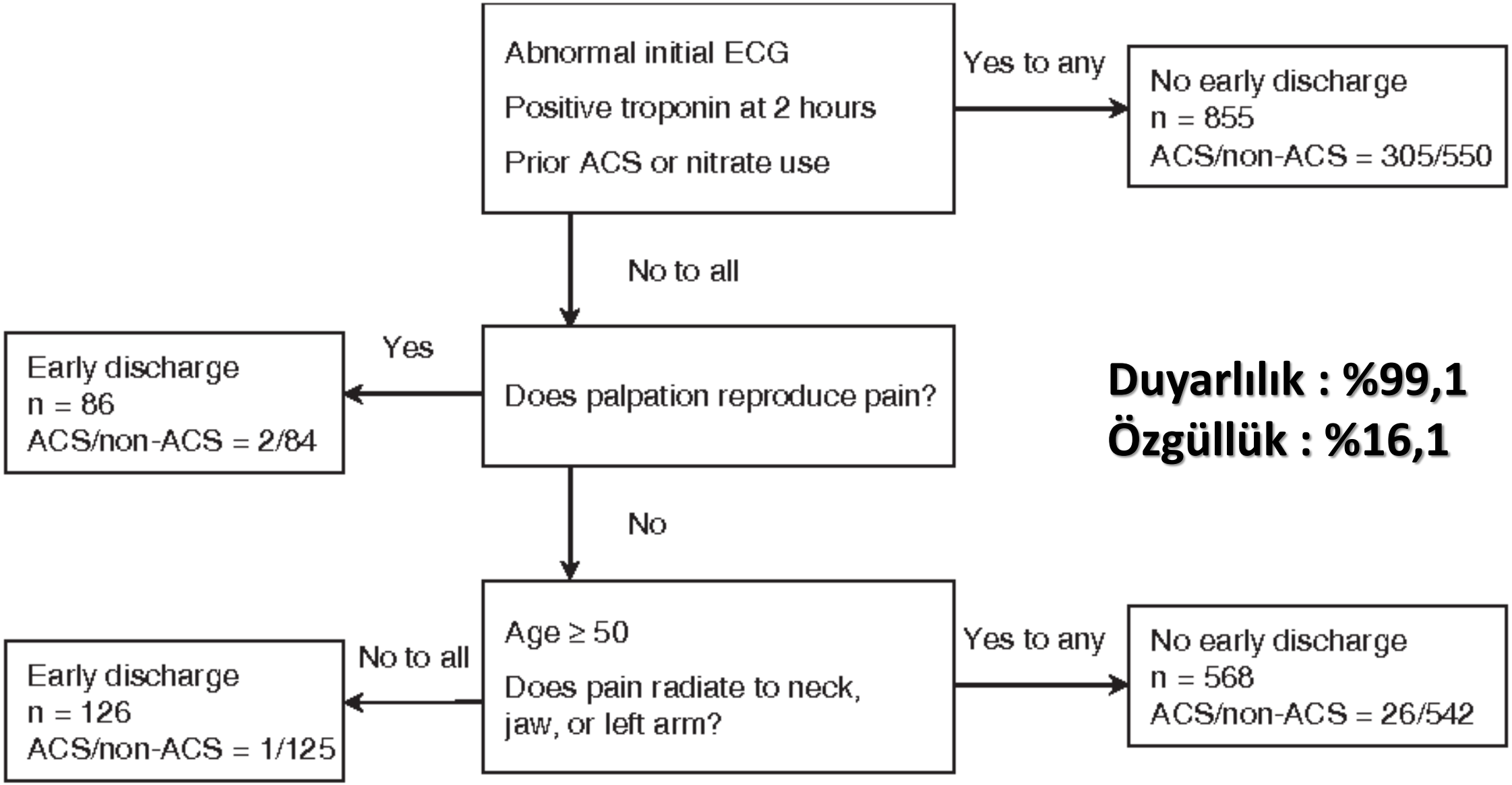
The new Vancouver Chest Pain Rule using troponin as the only biomarker: an external validation study. Am J Emerg Med. 2014 Feb;32(2):129-34

The new Vancouver Chest Pain Rule using troponin as the only biomarker: an external validation study



Duyarlılık %99.1

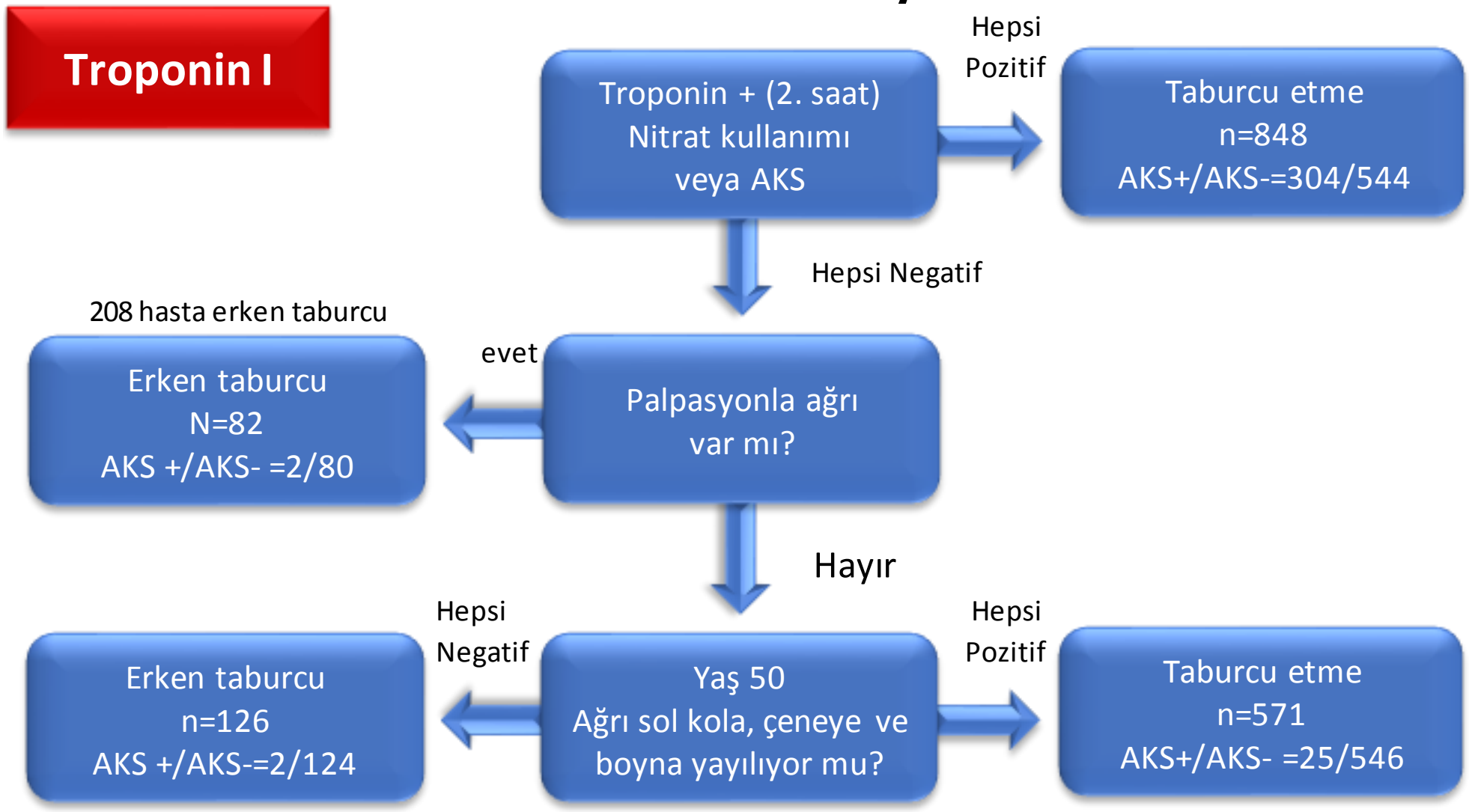
Özgüllük %16.1



Duyarlılık : %99,1
Özgüllük : %16,1

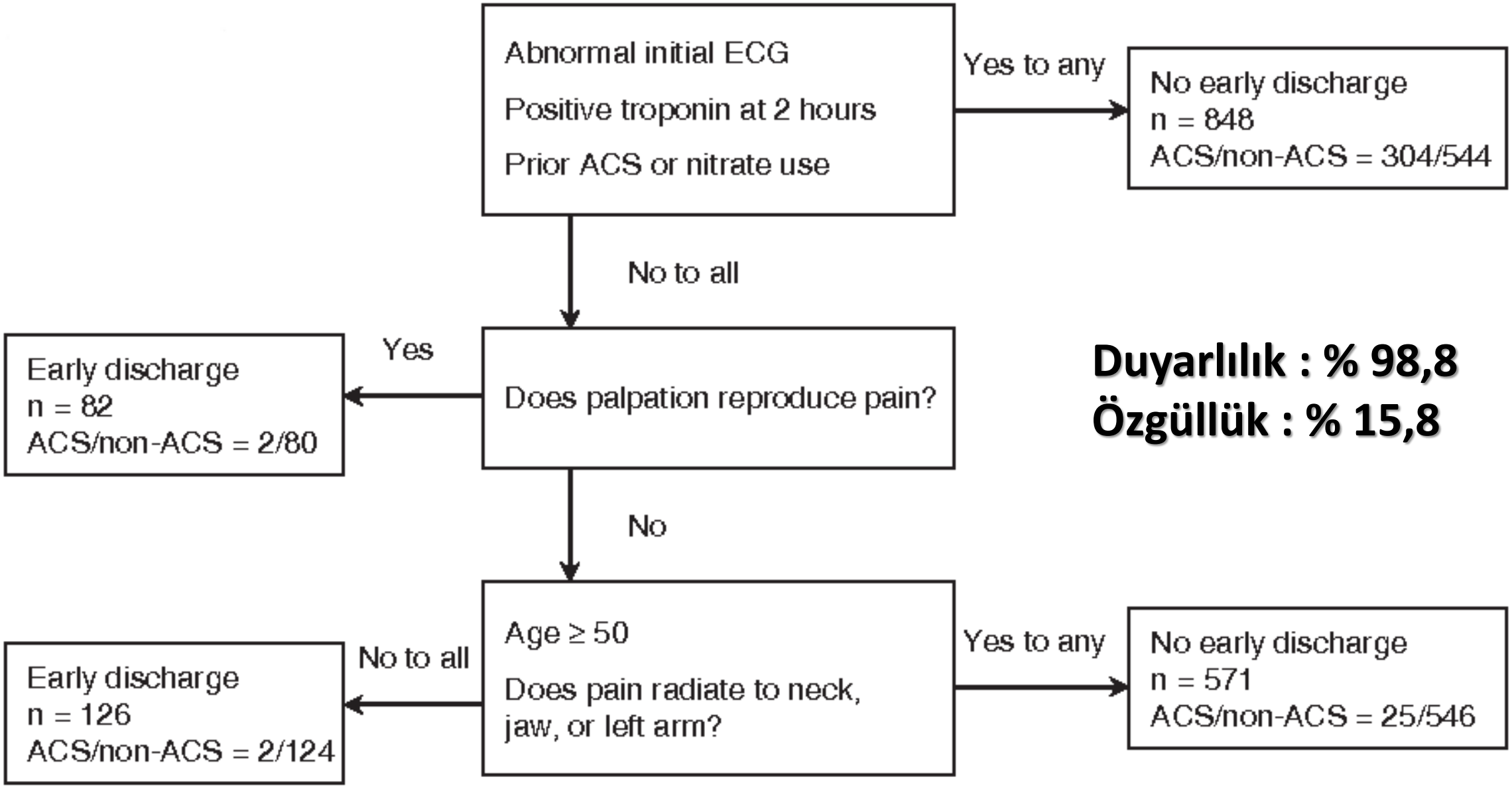
The new Vancouver Chest Pain Rule using troponin as the only biomarker: an external validation study. Am J Emerg Med. 2014 Feb;32(2):129-34

The new Vancouver Chest Pain Rule using troponin as the only biomarker: an external validation study



Duyarlılık %98.8

Özgüllük %15.8



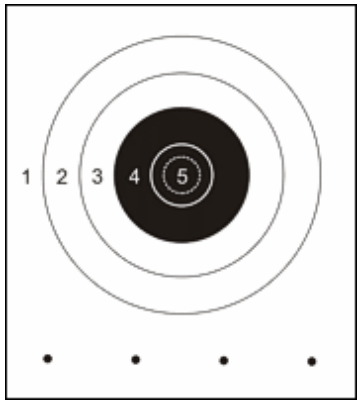
Duyarlılık : % 98,8
Özgüllük : % 15,8

The new Vancouver Chest Pain Rule using troponin as the only biomarker: an external validation study. Am J Emerg Med. 2014 Feb;32(2):129-34

VANCOUVER SKORU

Düşük Riskli AKS olan hasta taranması için **faydalı,**

Eski Vancouver göğüs ağrısı kuralı tam anlamıyla **doğrulanmamış,**



Yeni kural **1.635 hasta** üzerinde 2014 yılında **onaylanmış** ve **yayınlanmıştır,**

1.Christenson J. A clinical prediction rule for early discharge of patients with chest pain. Ann Emerg Med. 2006 Jan;47(1):1-10.
2.Jalili M. Validation of the Vancouver Chest Pain Rule: a prospective cohort study. Acad Emerg Med. 2012 Jul;19(7):837-42.
3.Cullen L et al. The new Vancouver Chest Pain Rule using troponin as the only biomarker: an external validation study. Am J Emerg Med. 2014 Feb;32(2):129-34

ORIGINAL RESEARCH • RECHERCHE ORIGINALE

Validation of the new Vancouver Chest Pain Rule in Asian chest pain patients presenting at the emergency department

Marcus Eng Hock Ong, MBBS, MPh*§; Ying Hao, PhD†; Susan Yap, RN*; Pin Pin Pek, PgDip*; Terrance Siang Jin Chua, MBBS‡¶; Faith Suan Peng Ng, MAppStat**; Swee Han Lim, MBBS*

Canadian Association of Emergency Physicians CJEM 2017;19(1):18-25

ABSTRACT

Objectives: The new Vancouver Chest Pain (VCP) Rule recommends early discharge for chest pain patients who are at low risk of developing acute coronary syndrome (ACS), and thus can be discharged within 2 hours of arrival at the emergency department (ED). This study aimed to assess the performance of the new VCP Rule for Asian patients presenting with chest pain at the ED.

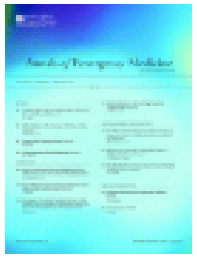
Methods: This prospective cohort study involved patients attended to at the ED of a large urban center. Patients of at least 25 years old, presenting with stable chest pain and a non-diagnostic ECG, and with no history of active coronary artery disease were included in the study. The main outcome measures were cardiac events, angioplasty, or coronary artery bypass within 30 days of enrolment.

Results: The study **included 1690 patients** from 27 August 2000 to 1 May 2002, with **661 patients fulfilling the VCP criteria.** Of those for early discharge, 24 had cardiac events and 13 had angioplasty or bypass at 30 days, compared to 91 and 41, respectively, for those unsuitable for discharge. This gave the rule a **sensitivity of 78.1%** for cardiac events, including angioplasty and bypass. **Specificity was 41.0%, and negative predictive value (NPV) was 94.4%.**

Conclusion: We found **the new VCP Rule to have moderate sensitivity and poor specificity for adverse cardiac events in our population.** With an NPV of less than 100%, this means that a small proportion of patients sent home with early discharge would still have adverse cardiac events.

Canadian Association of Emergency Physicians CJEM 2017;19(1):18-25

Annals of Emergency Medicine
Volume 59, Issue 2, February 2012, Pages 115-125.e1



Cardiology/original research

Development of a Clinical Prediction Rule for 30-Day Cardiac Events in Emergency Department Patients With Chest Pain and Possible Acute Coronary Syndrome

Erik P. Hess MD, MSc [a, d], Robert J. Brison MD [e], Jeffrey J. Perry MD, MSc [f, g], Lisa A. Calder MD, MSc [f, g], Venkatesh Thiruganasambandamoorthy MD, MSc [f, g], Dipti Agarwal MBBS [a], Annie T. Sadosty MD [a], Marco L.A. Silvilotti MD, MSc [e], Allan S. Jaffe MD [b], Victor M. Montori MD, MSc [c, d], George A. Wells PhD [g], Ian G. Stiell MD, MSc [f, g]

Annals of Emergency Medicine Volume 59, Issue 2, February 2012, Pages 115-125.e1

Study objective : Evaluation of emergency department (ED) patients with chest pain who are at low risk for acute coronary syndrome is resource intensive and may lead tofalse-positive test results and unnecessary downstream procedures. We seek to identify patients at low short-term risk for a cardiac event for whom additional ED investigations might be unnecessary.

Methods : We prospectively enrolled **patients older than 24 years and with a primary complaint of chest pain from 3 academic EDs.** Physicians completed standardized data collection forms before diagnostic testing. The primary adjudicated outcome was acute myocardial infarction, revascularization, or death of cardiac or unknown cause within 30 days. We used recursive partitioning to derive the rule and validated the model with 5,000 bootstrapreplications.

Results : **Of 2,718 patients** enrolled, 336 (12%) experienced a cardiac event within 30 days (6% acute myocardial infarction, 10% revascularization, 0.2% death). We developed a rule consisting of the absence of 5 predictors: ischemic ECG changes not known to be old, history of coronary artery disease, pain typical for acute coronary syndrome, initial or 6-hour troponin level greater than the 99th percentile, and age greater than 50 years. Patients aged 40 years or younger required only a single troponin evaluation. The rule was 100% sensitive (95% confidence interval 97.2% to 100.0%) and 20.9% specific (95% confidence interval 16.9% to 24.9%) for a cardiac event within 30 days.

Conclusion : **This clinical prediction rule identifies ED chest pain patients at very low risk for a cardiac event who may be suitable for discharge.** A prospective multicenter study is needed to validate the rule and determine its effect on practice.

Annals of Emergency Medicine Volume 59, Issue 2, February 2012, Pages 115-125.e1

Hess skoru (North American Chest Pain Rule)

İlk EKG'de yeni iskemi yok
KAH öyküsü yok
AKS için tipik ağrı yok
İlk Troponin Normal

≤40 yaş

Taburcu

41-50 yaş ise semptomların başlangıcından en az 6 saat sonra Troponin tekrarı Normal ise

30 günlük MACE için;

Duyarlılık	%100
Özgüllük	%20.9

Annals of Emergency Medicine Volume 59, Issue 2, February 2012, Pages 115-125.e1

Emergency. 2017; 5 (1): e11

OPEN ACCESS

ORIGINAL RESEARCH

Validation of the North American Chest Pain Rule in Prediction of Very Low-Risk Chest Pain; a Diagnostic Accuracy Study

Somayeh Valadkhani[1], Mohammad Jalili[2]*, Elham Hesari[1], Hadi Mirfazaelian[2]

1. Emergency Medicine Department, Kermanshah University of Medical Sciences, Kermanshah, Iran.
2. Emergency Medicine Department, Tehran University of Medical Sciences, Tehran, Iran.

Received: May 2016; Accepted: May 2016; Published online: 9 January 2017

Abstract: Introduction: Acute coronary syndrome accounts for more than 15% of the chest pains. Recently, Hess et al. developed North American Chest Pain Rule (NACPR) to identify very low-risk patients who can be safely discharged from emergency department (ED). The present study aimed to validate this rule in EDs of two academic hospitals.

Methods: A prospective diagnostic accuracy study was conducted on consecutive patients 24 years of age and older presenting to the ED with the chief complaint of acute chest pain, during March 2013 to June 2013. Chest pain characteristics, cardiac history, electrocardiogram findings, and cardiac biomarker measurement of patients were collected and screening performance characteristics of NACPR with 95% confidence interval were calculated using SPSS 21.

Results: **From 400 eligible patients** with completed follow up, 69 (17.25 %) developed myocardial infarction, 121 (30.25%) underwent coronary revascularization, and 4 (2%) died because of cardiac or unidentifiable causes. **By using NACPR, 34 (8.50%) of all the patients could be considered very low- risk and discharged after a brief ED assessment**. **Among these patients**, **none developed above-mentioned adverse outcomes within 30 days.** Sensitivity, specificity, positive prediction value, and negative prediction value of the rule were 100% (95% CI: 87.35 - 100.00), 45.35 (95% CI: 40.19 - 50.61), 14.52 (95% CI: 10.40 - 19.85), and 100 (95% CI: 97.18 - 100.00), respectively.

Conclusion: The present multicenter study showed that **NACPR is a good screening tool for early discharge of patients with very low-risk chest pain from ED.**

Emergency. 2017; 5 (1): e11

HEART skoru

HEART skoru ile MI, **perkutan koroner girişim**, CABG, 6 hafta içinde ölüm açısından **tanısal prediktif değer** hesaplanabilmektedir.

HEART skoru ile klinik gözlem, acil agresif tedavi ve taburculuk arasında **kanıta dayalı tercih** yapılabilir.

HEART skoru

Son zamanlarda geliştirilen HEART skoru; **klinik değerlendirmenin** hemen ardından gelir.

Bu nedenle acil serviste **göğüs ağrısını** değerlendirmede **daha geçerlidir**.

HEART skoru bir yandan **sağ kalım** diğer yandan **yaşamı tehdit eden** olaylarda (MACE) **güçlü bir belirleyicidir**.

https://www.mdcalc.com/heart-score-major-cardiac-events

The HEART Score for Chest Pain Patients in the ED		
History	• Highly Suspicious • Moderately Suspicious • Slightly or Non-Suspicious	• 2 points • 1 point • 0 points
ECG	• Significant ST-Depression • Nonspecific Repolarization • Normal	• 2 points • 1 point • 0 points
Age	• ≥ 65 years • > 45 - < 65 years • ≤ 45 years	• 2 points • 1 point • 0 points
Risk Factors	• ≥ 3 Risk Factors or History of CAD • 1 or 2 Risk Factors • No Risk Factors	• 2 points • 1 point • 0 points
Troponin	• ≥ 3 x Normal Limit • > 1 - < 3 x Normal Limit • ≤ Normal Limit	• 2 points • 1 point • 0 points
Risk Factors: DM, current or recent (<one month) smoker, HTN, HLP, family history of CAD, & obesity		
Score 0 – 3: 2.5% MACE over next 6 weeks → Discharge Home **Score 4 – 6:** 20.3% MACE over next 6 weeks → Admit for Clinical Observation **Score 7 – 10:** 72.7% MACE over next 6 weeks → Early Invasive Strategies		

Paper	Pts	HEART Score ≤3	MACE in HEART ≤3 (n)	MACE in HEART ≤3 (%)
Six 2008	120	39	1	2.6%
Backus 2010	880	303	3	0.9%
Mahler 2011	1070	904	5	0.6%
Six 2012	122	41	1	2.4%
Backus 2013	2388	870	15	1.7%
Mahler 2013	991	200	2	1%
Melki 2013	410	247	1	0.4%
~~Marcoon 2013~~	~~8252~~	~~5289~~	~~190~~	~~3.6%~~
Six 2013	2906	820	14	1.7%
~~Jellema 2013~~	~~720~~	~~87~~	~~4~~	~~4.6%~~
Visser 2014	255	85	5	5.9%
Leite 2015	174	98	2	2%
Mahler 2015	141	66	0	0%
Sun 2016	8255	4039	72	1.8%
Poldavaart 2016	3648	715	14	2.0%
Gopal (Prelim)	566	165	1	0.6%
Poldervaart 2017	1833	715	14	2.0%
Streitz 2017	417	31	0	0.0%
Reaney 2018	1046	251	1	0.4%
TOTAL	25,222	9589	151	1.6%

HEART Pathway

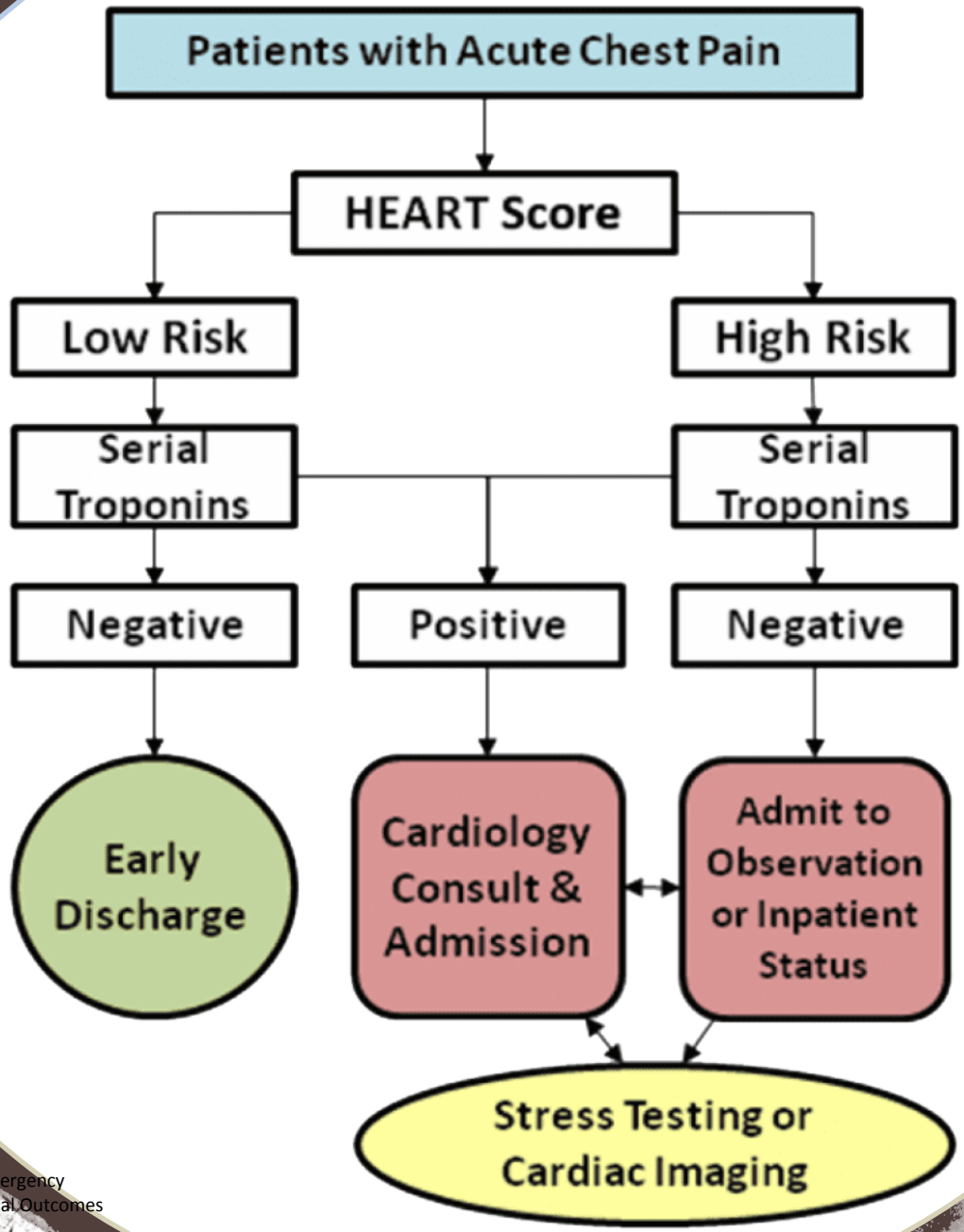
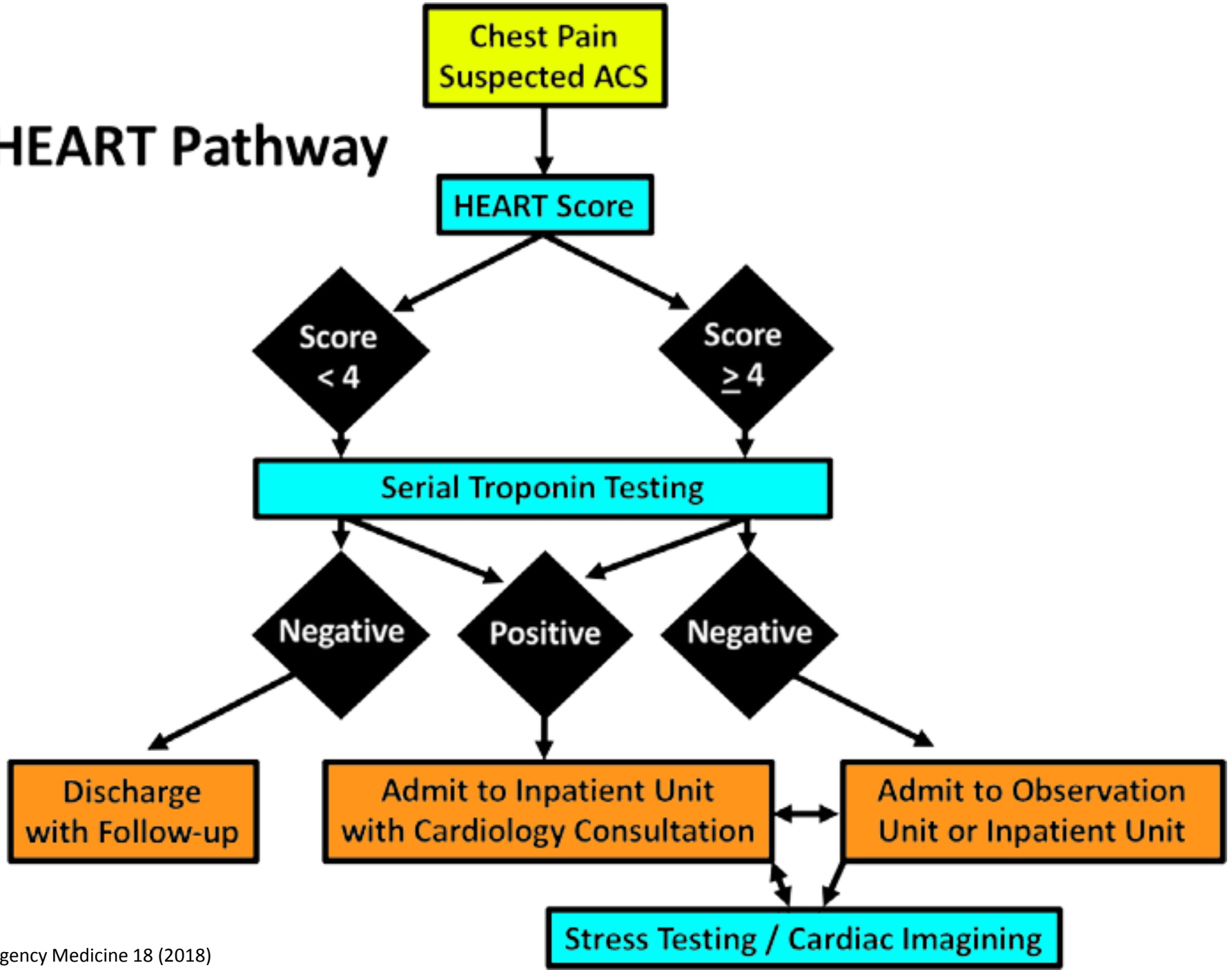


Image from Mahler SA et al. The HEART Pathway Randomized Trial Identifying Emergency Department Patients With Acute Chest Pain for EarlyDischarge.Circ.Cardiovasc Qual.Outcomes March 2015; 8 (2): 195 – 203.

The HEART Pathway



W. Brady, K. de Souza / Turkish Journal of Emergency Medicine 18 (2018)

Paper	Pts	HEART Score ≤3	MACE in HEART ≤3 (n)	MACE in HEART ≤3 (%) • 3hr Tn
Mahler 2013	991	200	2	1%
Mahler 2015	141	66	0	0%
Oliver 2018	449	255	0	0.0%
Stopyra 2018	141	66	0	0.0%
Total	1722	587	2	0.3%

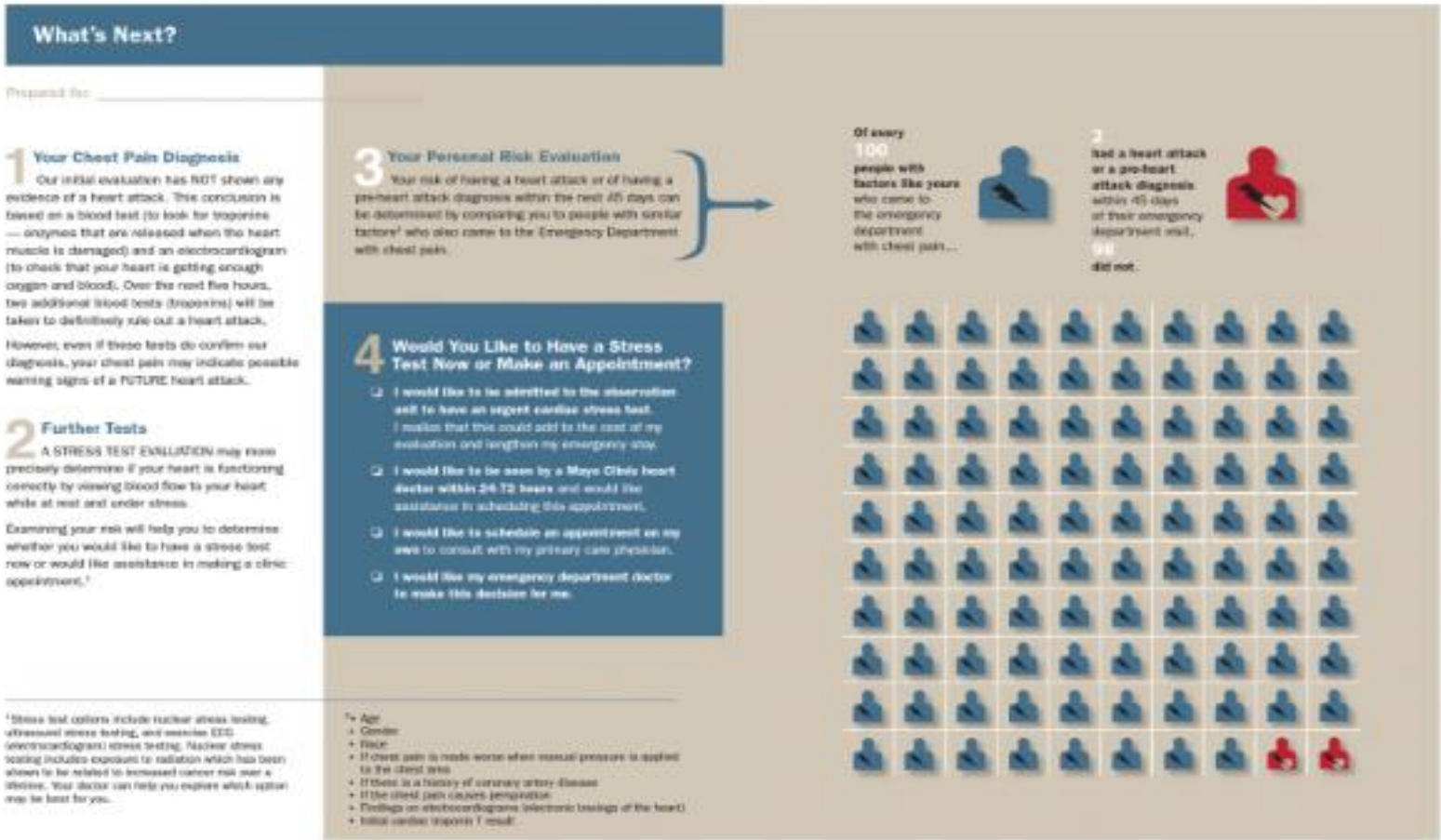


Figure 1. The Chest Pain Choice decision aid. Decision aid used to facilitate a discussion between clinicians and patients regarding whether to be admitted to the emergency department observation unit for cardiac stress testing or to follow up with a clinician within 24 to 72 hours. Reproduced with permission from Pierce et al.[6]

Low Risk Chest Pain

HEART Score 0 - 3 → 1.6%

Tn at 0 & 3 Hrs → 0.8%

Shared Decision Making → SDM

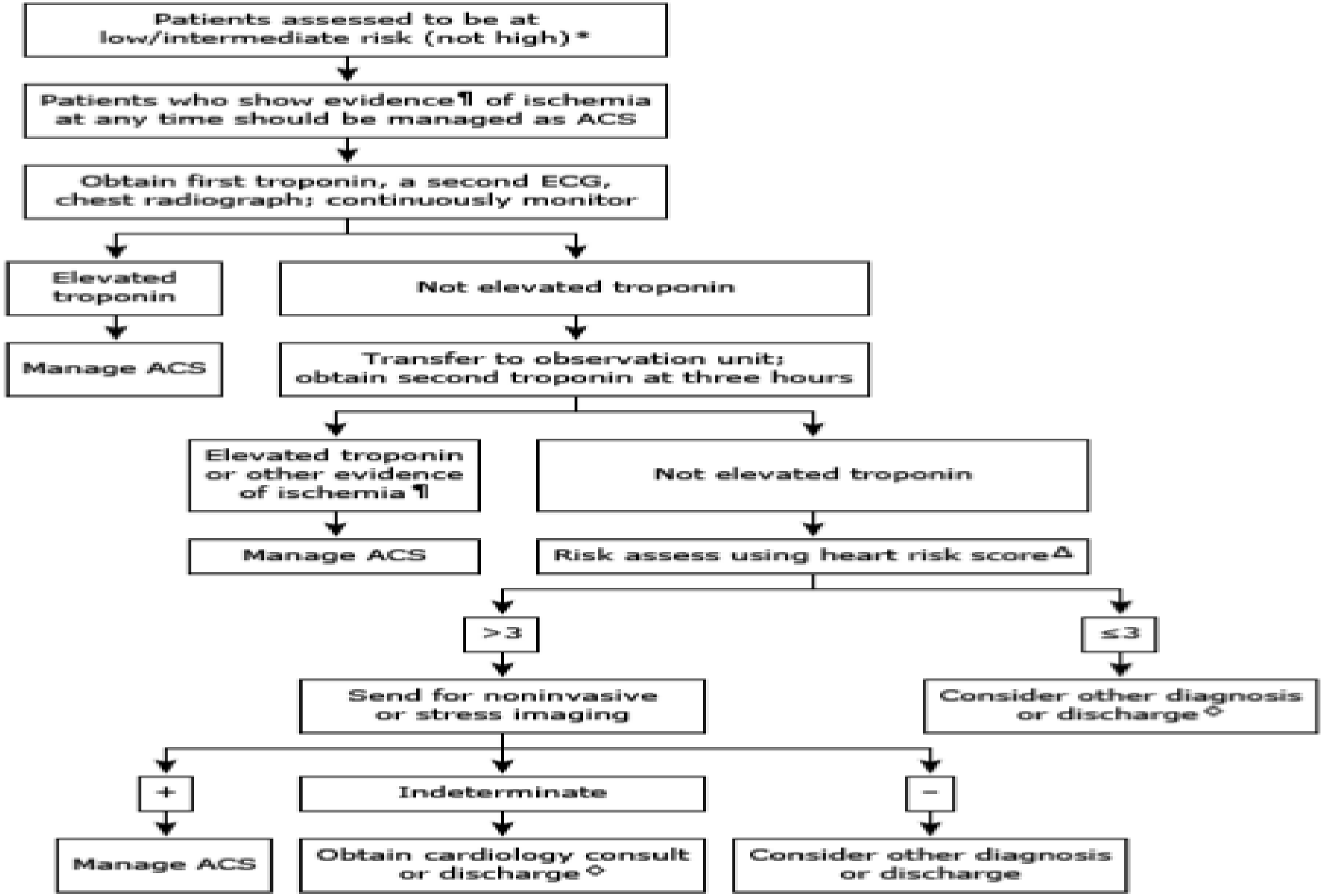
Evaluation of patients with chest pain at low or intermediate risk for acute coronary syndrome

Authors: Chadwick Miller, MD, MS, Christopher B Granger, MD
Section Editors: Christopher P Cannon, MD, James Hoekstra, MD, Allan S Jaffe, MD
Deputy Editor: Gordon M Saperia, MD, FACC

All topics are updated as new evidence becomes available and our peer review process is complete.

Literature review current through: Feb 2019. | **This topic last updated:** May 11, 2016.

Assessment of low/intermediate-risk acute coronary syndrome in the emergency department



Circulation

ORIGINAL RESEARCH ARTICLE

Safely Identifying Emergency Department Patients With Acute Chest Pain for Early Discharge

HEART Pathway Accelerated Diagnostic Protocol

Simon A. Mahler, MD, MS Kristin M. Lenoir, MPH Brian J. Wells, MD, PhD
Gregory L. Burke, MD, MSc Pamela W. Duncan, PhD L. Douglas Case, PhD
David M. Herrington, MD, MHS Jose-Franck Diaz-Garelli, PhD Wendell M.
Futrell, BS Brian C. Hiestand, MD, MPH Chadwick D. Miller, MD, MS

Circulation. 2018;138:2456–2468.

BACKGROUND: The HEART Pathway (history, ECG, age, risk factors, and initial troponin) is an accelerated diagnostic protocol designed to identify low-risk emergency department patients with chest pain for early discharge without stress testing or angiography. The objective of this study was to determine whether implementation of the HEART Pathway is safe (30-day death and myocardial infarction rate and effective (reduces 30-day hospitalizations) in emergency department patients with possible acute coronary syndrome.

METHODS: A prospective pre-post study was conducted **at 3 US sites among 8474 adult emergency department patients with possible acute coronary syndrome.** Patients included were ≥21 years old, investigated for possible acute coronary syndrome, and had no evidence of ST-segment–elevation myocardial infarction on ECG. Accrual occurred for 12 months before and after HEART Pathway implementation from November 2013 to January 2016. The HEART Pathway accelerated diagnostic protocol was integrated into the electronic health record at each site as an interactive clinical decision support tool. After accelerated diagnostic protocol integration, ED providers prospectively used the HEART Pathway to identify patients with possible acute coronary syndrome as low risk (appropriate for early discharge without stress testing or angiography) or non-low risk (appropriate for further in-hospital evaluation). The primary safety and effectiveness outcomes, death, and myocardial infarction (MI) and hospitalization rates at 30 days were determined from health records, insurance claims, and death index data.

Circulation. 2018;138:2456–2468.

RESULTS: Preimplementation and postimplementation cohorts included 3713 and 4761 patients, respectively. **The HEART Pathway identified 30.7% as low risk; 0.4% of these patients experienced death or MI within 30 days.** Hospitalization at 30 days was reduced by 6% in the postimplementation versus preimplementation cohort (55.6% versus 61.6%; adjusted odds ratio, 0.79; 95% CI, 0.71–0.87). During the index visit, more MIs were detected in the postimplementation cohort (6.6% versus 5.7%; adjusted odds ratio, 1.36; 95% CI, 1.12–1.65). Rates of death or MI during follow-up were similar (1.1% versus 1.3%; adjusted odds ratio, 0.88; 95% CI, 0.58–1.33).

CONCLUSIONS: HEART Pathway implementation was associated with **decreased hospitalizations**, increased identification of index visit MIs, and a very low death and MI rate among low-risk patients. These findings support use of the **HEART Pathway to identify low-risk patients who can be safely discharged without stress testing or angiography.**

CLINICAL TRIAL REGISTRATION: URL: http://www.clinicaltrials.gov. Unique identifier: NCT02056964.

Circulation. 2018;138:2456–2468.

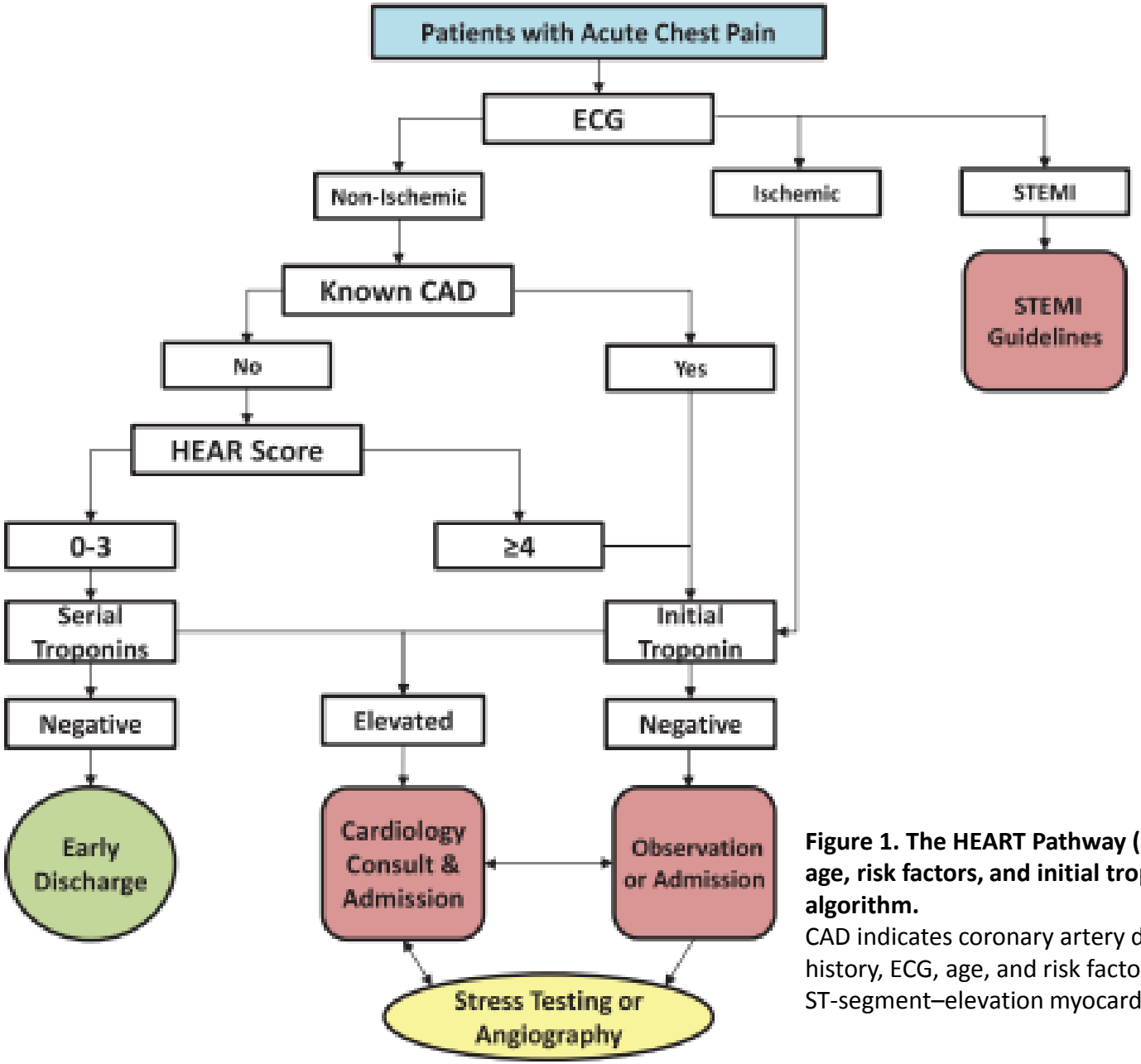


Figure 1. The HEART Pathway (history, ECG, age, risk factors, and initial troponin) algorithm.
CAD indicates coronary artery disease; HEAR, history, ECG, age, and risk factors; and STEMI, ST-segment–elevation myocardial infarction.

Circulation. 2018;138:2456–2468.

Clinical Perspective

What Is New?

- Among the 30.7% of patients identified by the HEART Pathway (history, ECG, age, risk factors, and initial troponin) as low risk, the rate of all-cause death and myocardial infarction was 0.4%.
- Implementation of the HEART Pathway was associated with increased detection of index visit myocardial infarctions, with an adjusted odds ratio of 1.36 (95% CI, 1.12–1.65).
- Hospitalizations from the index visit through 30 days were decreased by 6% after HEART Pathway implementation.
- HEART Pathway implementation increased early discharge from the emergency department by 5.6%, decreased the median index visit length of stay by 2.1 hours, and reduced stress testing and angiography at 30 days by 3.8%.

What Are the Clinical Implications?

- These findings demonstrate that the HEART Pathway is safe and effective at increasing early emergency department discharges and decreasing hospitalizations, stress testing, and index visit length of stay in patients with acute chest pain.
- Given its ability to safely reduce healthcare utilization outcomes, the HEART Pathway may provide a model for health systems to provide safe and high-value care to patients presenting to emergency departments with chest pain.

Comparison of the HEART and TIMI Risk Scores for Suspected Acute Coronary Syndrome in the Emergency Department

Sun, Benjamin C. MD, MPP; Laurie, Amber MS; Fu, Rongwei PhD; Ferencik, Maros MD, PhD; Shapiro, Michael MD; Lindsell, Christopher J. PhD; Diercks, Deborah MD; Hoekstra, James W. MD; Hollander, Judd E. MD; Kirk, J. Douglas MD; Peacock, W. Frank MD; Anantharaman, Venkataraman MD; Pollack, Charles V. Jr MA, MD

Critical Pathways in Cardiology: March 2016 - Volume 15 - Issue 1 - p 1–5
doi: 10.1097/HPC.0000000000000066

Crit Pathw Cardiol. 2016 Mar; 15 (1): 1-5.

Objectives: The emergency department evaluation for suspected acute coronary syndrome (ACS) is common, costly, and challenging. Risk scores may help standardize clinical care and screening for research studies. The Thrombolysis in Myocardial Infarction (TIMI) and HEART are two commonly cited risk scores. We tested the null hypothesis that the TIMI and HEART risk scores have equivalent test characteristics.

Methods: We analyzed data from the Internet Tracking Registry of Acute Coronary Syndromes (i*trACS) from **9 EDs on patients with suspected ACS**, 1999–2001. We excluded patients with an emergency department diagnosis consistent with ACS, or without sufficient data to calculate TIMI and HEART scores. The primary outcome was 30-day major adverse cardiovascular events, including all-cause death, acute myocardial infarction, and urgent revascularization. We describe test characteristics of the TIMI and HEART risk scores.

Crit Pathw Cardiol. 2016 Mar; 15 (1): 1-5.

Results: The study cohort included 8255 patients with 508 (6.2%) 30-day major adverse cardiovascular events. Receiver operating curve and reclassification analyses favored HEART [*c* statistic: 0.753, 95% confidence interval (CI): 0.733–0.773; continuous net reclassification improvement: 0.608, 95% CI: 0.527–0.689] over TIMI (*c* statistic: 0.678, 95% CI: 0.655–0.702). A HEART score 0–3 [negative predictive value (NPV) 0.982, 95% CI: 0.978–0.986; positive predictive value (PPV) 0.103, 95% CI: 0.094–0.113; likelihood ratio (LR) positive 1.76; LR negative 0.28] demonstrates similar or superior NPV/PPV/LR compared with TIMI = 0 (NPV 0.978, 95% CI: 0.971–0.983; PPV 0.077, 95% CI: 0.071–0.084; LR positive 1.28; LR negative 0.35) and TIMI = 0–1 (NPV 0.963, 95% CI: 0.958–0.968; PPV 0.102, 95% CI: 0.092–0.113; LR positive 1.73; LR negative 0.58).

Conclusions: The HEART score has better discrimination than TIMI and outperforms TIMI within previously published "low-risk" categories.

Crit Pathw Cardiol. 2016 Mar; 15 (1): 1-5.

Taylor & Francis
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Scandinavian Cardiovascular Journal

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The objective CORE score allows early rule out in acute chest pain patients

Catharina Borna, Knut Kollberg, David Larsson, Arash Mokhtari & Ulf Ekelund

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To link to this article: https://doi.org/10.1080/14017431.2018.1546891

Cardiovascular Journal, 52:6, 308-314,

Objectives. Chest pain is a common complaint in the emergency department (ED), and it is a challenge to identify low-risk chest pain patients eligible for early discharge. We aimed to develop a simple objective decision rule to exclude 30-day major adverse cardiac events (MACE) in ED chest pain patients.

Design. We analyzed prospectively included patients presenting with chest pain. Low risk patients were identified with **the clinical objective rule-out evaluation** (CORE). CORE was based on high sensitivity cardiac troponin T (hs-cTnT) tests at ED presentation (0 h) and 2 h later together with a simplified risk score consisting of four objective variables: age 65 years and a history of arterial disease, hypertension or diabetes. For the patient to be classified as low risk in the CORE rule, hs-cTnT had to be 14 ng/L both at 0 and 2 h, and the sum of the risk score had to be 0. The primary outcome was MACE within 30 days.

Results. Among the 751 patients in the final analysis, 90 (11.9%) had a MACE. **CORE identified 248 (33%) of patients as low risk with a sensitivity of 98.9% (CI 93.1–99.9) and a negative predictive value of 99.6% (95% CI 97.4–100) for 30-day MACE. Adding the ED physician's interpretation of the ECG to CORE did not improve diagnostic performance.**

Conclusion. A simple objective decision rule (CORE) identified one-third of all patients as having a very low 30-day risk of MACE. These patients may potentially be discharged without additional investigations for acute coronary syndrome.

Cardiovascular Journal, 52:6, 308-314,

Table 1. The CORE rule.

The CORE rule
Age <65 years
No history of arterial disease*
No history of hypertension
No history of diabetes mellitus
Hs-cTnT ≤14 ng/L at 0 and 2 h
If all criterias are met, the patient may be discharged without further investigation för ACS.

All criteria had to be met for the patient to be classified as low risk.
*Previous MI, PCI or CABG, demonstrated coronary stenosis >50% or extra-cardiac arterial disease (intracerebral, intraabdominal, peripheral)

Cardiovascular Journal, 52:6, 308-314,

Non İnvaziv Değerlendirme

- İnvazif olmayan kardiyovasküler testler, kesin MI kanıtı olmayan ve tanıyı dışlamadan **taburcu edilmesinin** riskli olduğu **miyokard iskemi şüphesi devam eden** hastalarda kullanılabilir.

- İnvaziv olmayan **kardiyovasküler testler** genellikle taburculuk, invaziv koroner anjiyografi ihtiyacı veya semptomların diğer nedenlerini **değerlendirmede** yardımcı olur.

Non İnvaziv Değerlendirme

- **Akut göğüs ağrısı** açısından değerlendirilen birçok hasta;

  -AMI için tanısal olmayan **başlangıç troponin değerleri**

  -Normal veya **iskemik - diyagnostik olmayan** EKG ve

  -Semptomlarda **azalma** varsa

  AKS açısından **düşük-orta risk** olarak değerlendirilir.

Sonuç olarak, bu kişiler **kararsız anjina**, **iskemik olmayan kardiyak ağrı** veya **kardiyak olmayan ağrıya** sahip olabilir.

Bu hastaların değerlendirilmesi genellikle **hastane acil servislerinde** veya **gözlem ünitelerinde** yapılır.

Noninvasive testing and imaging for diagnosis in patients at low to intermediate risk for acute coronary syndrome – UpToDate. 06.03.2019

Uygulanabilir Testler

- **İstirahat Görüntülemesi:**

-Kalbe stres **uygulanmaz**. Bunlar **semptomatik** hastalarda uygulanır.

-Acil serviste **AKS olası hastaları** değerlendirmede **3 major istirahat görüntüleme** modalitesi mevcuttur.

- Radyonükleid **miyokard perfüzyon** görüntüleme
- **Ekokardiyografi**
- Bilgisayarlı **koroner anjiyografi**.

Uygulanabilir Testler

- **Provakatif (stres) testleri:**

-Klinik stabil (semptomları **geçen/minimal** semptomu olan, hemodinamisi **normal**, EKG'si normal/tanısal **olmayan**, troponin değerleri **yükselmeyen**) hastalara uygulanır.

- ✓ **Treadmil** egzersiz tolerans testi,
- ✓ **Stres radyonükleid myokard perfüzyon** görüntüleme (SPECT)(egzersiz veya farmakolojik),
- ✓ Stres **Ekokardiyografi**,
- ✓ Kardiyak **MR görüntüleme**,

Noninvasive testing and imaging for diagnosis in patients at low to intermediate risk for acute coronary syndrome – UpToDate. 06.03.2019

Objektif Kardiyak Testler

Stres elektrokardiyografi

Stres ekokardiyografi

Nükleer tıp tetkikleri

BT koroner anjiografi

Stress EKG

- Kardiyak enzim **6-8 saatlik** takipte normal
- Gözlemde tekrarlayan iskemik ağrısı olmayan ve bilinen koroner arter hastalığı olmayan hastalarda **tanı için ilk yöntem** olarak uygulanmaktadır.
- Hastaların olası AKS olarak tanımlamasından hemen sonra gerçekleştirilen **stres testi güvenilir bir seçenek** olarak görünmektedir.

Pozitif stres testi

- QRS kompleksinin bitiminden itibaren en az 60-80 msn süren
- 1 mm'den fazla horizontal veya aşağı eğimli ST-segment çökme ve yükselmesi

Ekokardiyografi

- Duvar hareketlerinin **istirahatta** ve **stres altında** incelenmesi AKS' li hastalarda **kullanılabilir**.
- Miyokardiyal iskemi ve enfarktı birbirinden **ayırt edemez**.
- Subendokardiyal iskemiyi saptamada **güvenilir değildir**.
- Acil serviste normal bir istirahat ekokardiyografinin AKS'yi dışlamada **yeri yoktur**.

Stres ekokardiyografisi

Koroner hastalığı saptamada **%80** duyarlı ve **%84** özgündür.

Nükleer Tıp

- Göğüs ağrısı ile başvurup acil servis takibinde EKG'leri **tanı koydurucu olmayan** ve başlangıçta bakılan **kardiyak enzimleri normal** olan hastalara öncelikle istirahatte **miyokard perfüzyon sintigrafisi** yapılır.

- MPS'de iskemi saptanması kesin **akut koroner sendrom tanısı** koydurur.

Nükleer Tıp

- İstirahat MPS'nin **normal çıktığı** veya takip EKG ve kardiyak enzimleri **normal olan** hastalara aynı gün **istirahat/stres MPS yapılır**.

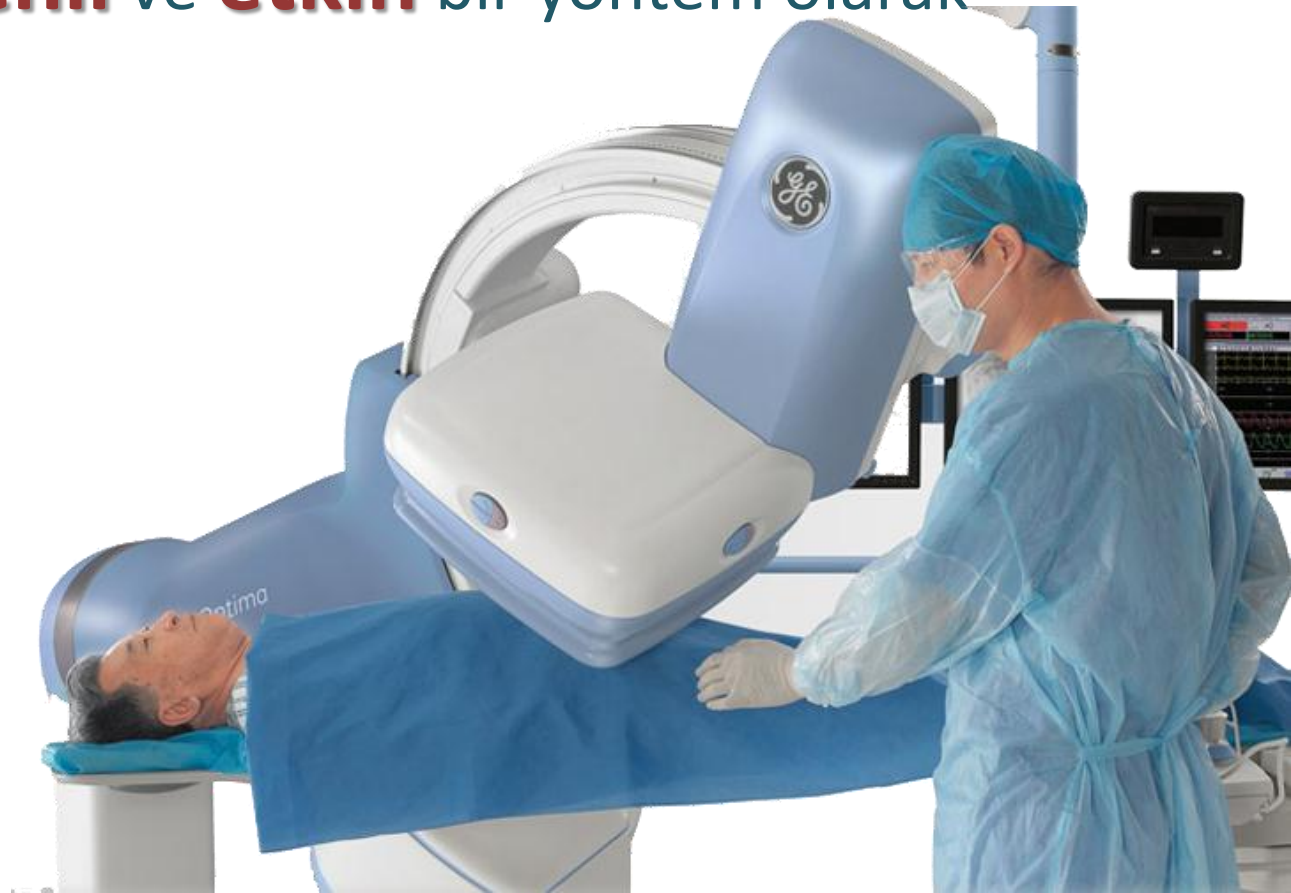
- Bunun sonucunda iskemi saptananlar AKS olarak takip edilirken **normal MPS bulgusu** olanlar acil servisten **non-kardiyak göğüs ağrısı tanısı** ile taburcu olurlar.

Koroner BT anjiografi

- Acil serviste **KBTA** ile gerçekleştirilen **risk sınıflamasına** ait çalışmalar halen **yayınlanmaktadır**.
- KBTA AKS değerlendirilmesinde **güvenli** ve **etkin** bir yöntem olarak görünmektedir.

Koroner BT anjigrafi

- Güvenli
- Maliyet az!!
- Etkili
- Taburculuk hızlı
- Radyasyona maruziyet!!!



Koroner BT anjiografi

Avantajları	Dezavantajları
Non-invaziv	İyonizan radrasyona maruziyet
Hızlı	IV kontrasta maruziyet
Konforlu	Özel eğitimli teknik eleman ihtiyacı
Hastaneye Yatış gerektirmez	Kardiyak fonksiyonlar hakkında kısıtlı bilgi
Damar duvarındaki aterosklerotik değişiklikleri göstermesi	Böbrek yetmezliği
	Gebelik
	Obesite, koopere olmayan hasta
	Belirgin koroner kalsifikasyon

Teknik

Koroner arter değerlendirilmesi

- ✓ Yüksek **zamansal çözünürlük** (Bir görüntünün alınma süresi)
- ✓ Yüksek **uzaysal çözünürlük** (Görüntüdeki birbirinden ayrılabilen en yakın nokta)

4 kesitli
16 kesitli
64 kesitli
128 kesitli
256 kesitli
320 kesitli

KESİT SAYISI ARTTIKÇA

RADRASYON MARUZİYETİ AZALIYOR
HIZ KONTROLÜNE GEREK KALMIYOR
GÖRÜNTÜ KALİTESİ ARTIYOR
VERİLEN KONTRAST MADDE AZALIYOR

- **ESC 2011 klavuzu:**

Düşük riskli hastalarda rutin invaziv değerlendirme önerilmemektedir.

III **A**

- **ACC/AHA 2012 klavuzu:**

- **Düşük risk skoru olanlar (TIMI veya GRACE risk skoru)**
- **Yüksek risk yokluğunda hasta ve doktorun tercihi olarak.**
- **İleri komorbiditesi olan veya rızası olmayan hastalara invaziv tedavi önerilmemektedir.**

Acil Servis taburculuk (2014 AHA)

- Seri EKG'leri ve kardiyak troponin düzeyleri normal olan **muhtemel** AKS hastalarında, taburculuk öncesi veya taburculuk sonrası **72 saat içerisinde**,
  - Treadmill EKG **(Kanıt düzeyi : A)**
  - Stres MPI veya stres ekokardiyografi **(Kanıt Düzeyi : B)**

Acil Servis taburculuk (2014 AHA)

- Normal seri **EKG**'leri ve **kardiyak troponin** düzeyleri olan, koroner arter hastalığı öyküsü **olmayan** muhtemel AKS hastalarında, başlangıçta (seri EKG ve troponin olmaksızın) **koroner arter anatomisini** değerlendirmek için,

  - Koroner bilgisayarlı tomografi çekilmesi **(Kanıt Düzeyi: A)**
  - Tec 99m ile rest MPI yapılması **(Kanıt Düzeyi: B).**

Sonuç

- Düşük riskli hastaya **yaklaşımda**,
  - –Bir tane **en iyi yöntem** yoktur,
  - –Kaynaklar **göz önünde** bulundurulmalı,
- AKS'nin sadece **kardiyak belirteçlere** dayanarak dışlanması,
  - –Destekleyen bir veri **yok**,
  - –Kardiyak görüntüleme **gerekiyor**,

Sonuç

- Olası AKS'li hastalarda **tek negatif kardiyak** belirteçten sonra egzersiz stres testi,
  - –Düşük-orta risk grubunda **güvenli**,
- Ayaktan **stres** testi,
  - –AMI **dışlandığı**,
  - –Düşük riskli **güvenilir** hastalar,
  - –Uygun klinik,

“Low-risk” is not no risk

Teşekkür ederim

Dr. Evrim GÜL

F.Ü Tıp Fak. Acil Tıp AD