Accelerated Diagnostic Pathway for Suspected ACS and the Transition to High-Sensitivity Troponin

Mount Sinai

Discussion Outline

Background and benefits of high-sensitivity troponin

Key differences and similarities between high-sensitivity and conventional troponin

- Special populations
- Sex-specific cutoffs

Review of the ACS Accelerated Diagnostic Pathway

High-Sensitivity Troponin

Mount Sinai

Why??

Greater clinical sensitivity for myocardial injury

Accurate recognition of small changes in troponin concentration (rise or fall) within a short time frame

Value of high sensitivity troponin I

1. ANALYTICAL

- Improved precision
- Improved sensitivity

2. CLINICAL

- Helps aid faster, more accurate diagnosis of MI
- Faster decisions on discharge and admission
- May improve diagnosis of MI in women[19]

3. FINANCIAL

- Fewer unnecessary procedures and tests
- May reduce costs, length of stay, admissions rates and overnight stays[20,25]

European Heart Journal (2016) **37**, 3324–3332
doi:10.1093/eurheartj/ehw232

CLINICAL RESEARCH
Acute coronary syndromes

Impact of high-sensitivity cardiac troponin on use of coronary angiography, cardiac stress testing, and time to discharge in suspected acute myocardial infarction

Raphael Twerenbold[1,2], Cedric Jaeger[1,2], Maria Rubini Gimenez[1,2], Karin Wildi[1,2], Tobias Reichlin[1,2], Thomas Nestelberger[1,2], Jasper Boeddinghaus[1,2], Karin Grimm[1,2], Christian Puelacher[1,2], Berit Moehring[1,2], Gil Pretre[1,2], Nicolas Schaerli[1,2], Isabel Campodarve[3], Katharina Rentsch[4], Stephan Steuer[5], Stefan Osswald[1,2], and Christian Mueller[1,2]*

- Acute MI more often the clinical discharge diagnosis after high sensitivity troponin introduction
- Rate of coronary angiography was similar before and after
- Use of stress testing was substantially reduced from 29 to 19%
- Median time to discharge from the ED for non-admitted patients decreased by 79 min

A Rule-Out Strategy Based on High-Sensitivity Troponin and HEART Score Reduces Hospital Admissions

Lina Ljung, MD*; Bertil Lindahl, MD, PhD; Kai M. Eggers, MD, PhD; Mats Frick, MD, PhD; Rikard Linder, MD, PhD; Henrik B. Löfmark, MD; Arne Martinsson, MD, PhD; Dina Melki, MD, PhD; Nondita Sarkar, MD, PhD; Per Svensson, MD, PhD; Tomas Jernberg, MD, PhD

*Corresponding Author. E-mail: lina.ljung@sll.se.

Prospective observational multicenter study (Annals of Emergency Medicine) showed decrease in:

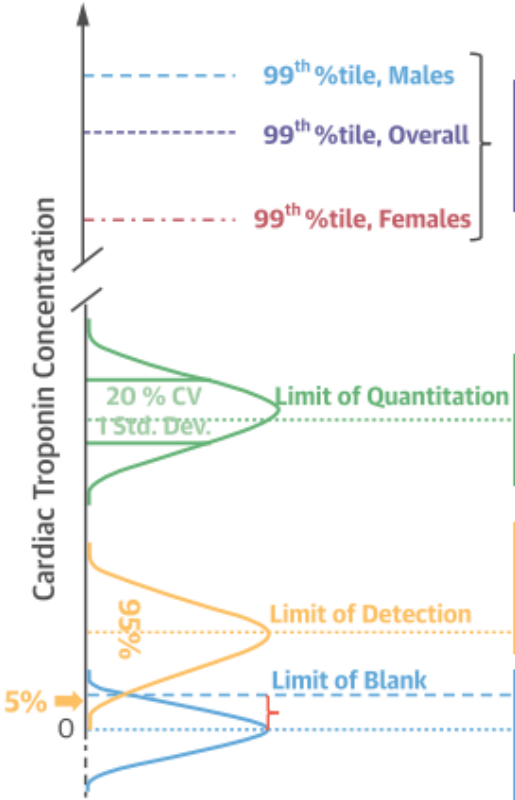
- Admission rates
- Cost
- ED length of stay

when high sensitivity troponin combined with HEART score

What classifies troponin assay as high-sensitivity?

- Allows establishment of **sex-specific cutoffs**
- Posses a **low LoD** (Level of Detection)
- Capable of ***measuring*** **values >50% in both *healthy* female and male** populations above the LoD
- Detectable within 3 hours of onset

FIGURE 1 **Various Analytic Definitions to Familiarize Clinicians**



99th percentile (%tile) clinical decision values:
Male cut-offs >overall cut-offs > Female cut-offs
Sex-specific cut-offs should be used for interpretation with high-sensitivity cTn assays.

Limit of Quantitation (LoQ). Represents cTn value at which the value can be reliably reported as a number. LoQ is typically cTn concentration where assay's Total CV = 20%. LoQ always exceeds LoD.

Limit of Detection (LoD). The mean signal at which 5% of the frequency distribution is below the LoB, i.e., 95% Confidence that cTn is present in the sample. LoD always exceeds LoB.

Limit of Blank (LoB). Represents the 'noise' signal inherent in the analytical system. LoB is the 95th percentile of analytic signal when no cTn (0 ng/L) is present in samples tested, only matrix (serum or plasma).

An understanding of these terms facilitates transition to high-sensitivity cardiac troponin testing. %tile = percentile; cTn = cardiac troponin; CV = coefficient of variation; LoB = limit of blank; LoD = limit of detection; LoQ = limit of quantitation; Std. Dev. = standard deviation.

hs-Trop Interpretation

Reported in **ng/L** INSTEAD of **ng/mL**

Troponin I and T are ORGAN specific,

but *not disease specific*

TABLE 1 Differential Diagnosis for an Elevated hs-cTn Result

Injury related to primary myocardial ischemia
Plaque rupture
Intraluminal thrombus
Injury related to myocardial oxygen supply/demand imbalance
Tachy/bradyarrhythmias
Aortic dissection or severe aortic valve disease
Hypertrophic cardiomyopathy
Cardiogenic, hypovolemic, or septic shock
Severe respiratory failure
Severe anemia
Hypertension with or without left ventricular hypertrophy
Coronary endothelial dysfunction, spasm, or dissection
Injury not related to myocardial ischemia
Cardiac contusion, surgery, ablation, pacing or defibrillation
Rhabdomyolysis with cardiac involvement
Myocarditis
Cardiotoxic agents (e.g., anthracyclines, Herceptin)
Multifactorial or indeterminate myocardial injury
Heart failure
Stress cardiomyopathy
Pulmonary embolism
Pulmonary hypertension
Sepsis
Critical illness
Renal failure
Severe acute neurological disease (e.g., stroke, subarachnoid hemorrhage)
Infiltrative cardiomyopathies (e.g., amyloidosis, sarcoidosis)
Strenuous exercise

A key knowledge point is an elevated hs-cTn identifies the presence of myocardial injury but not the mechanism.

hs-cTn = high-sensitivity cardiac troponin.

High Sensitivity Troponin Interpretation

Not “negative” or “positive”

- Undetectable (below the LOD)
- Measurable but ***below the 99th percentile by sex***
- Meaurable and ***above the 99th percentile by sex***

Higher the cTn level → Higher is the likelihood for the presence of MI

When referring to levels in the normal range, the same concept applies: the lower the cTn blood concentration, the lower the likelihood for MI

Assay Interpretation for Transgender Patients

Transgender patients should be evaluated using the lower cutoffs

Studies have shown that patients presumed male at birth have larger cardiac mass resulting in increased Troponin levels

In one study, transgender patients on hormonal therapy had similar sex-based differences in Troponin assay as their cisgender counterparts

Patients who are registered as Unknown and patients who prefer to not disclose their sex or gender will follow the pathway with lower cutoffs

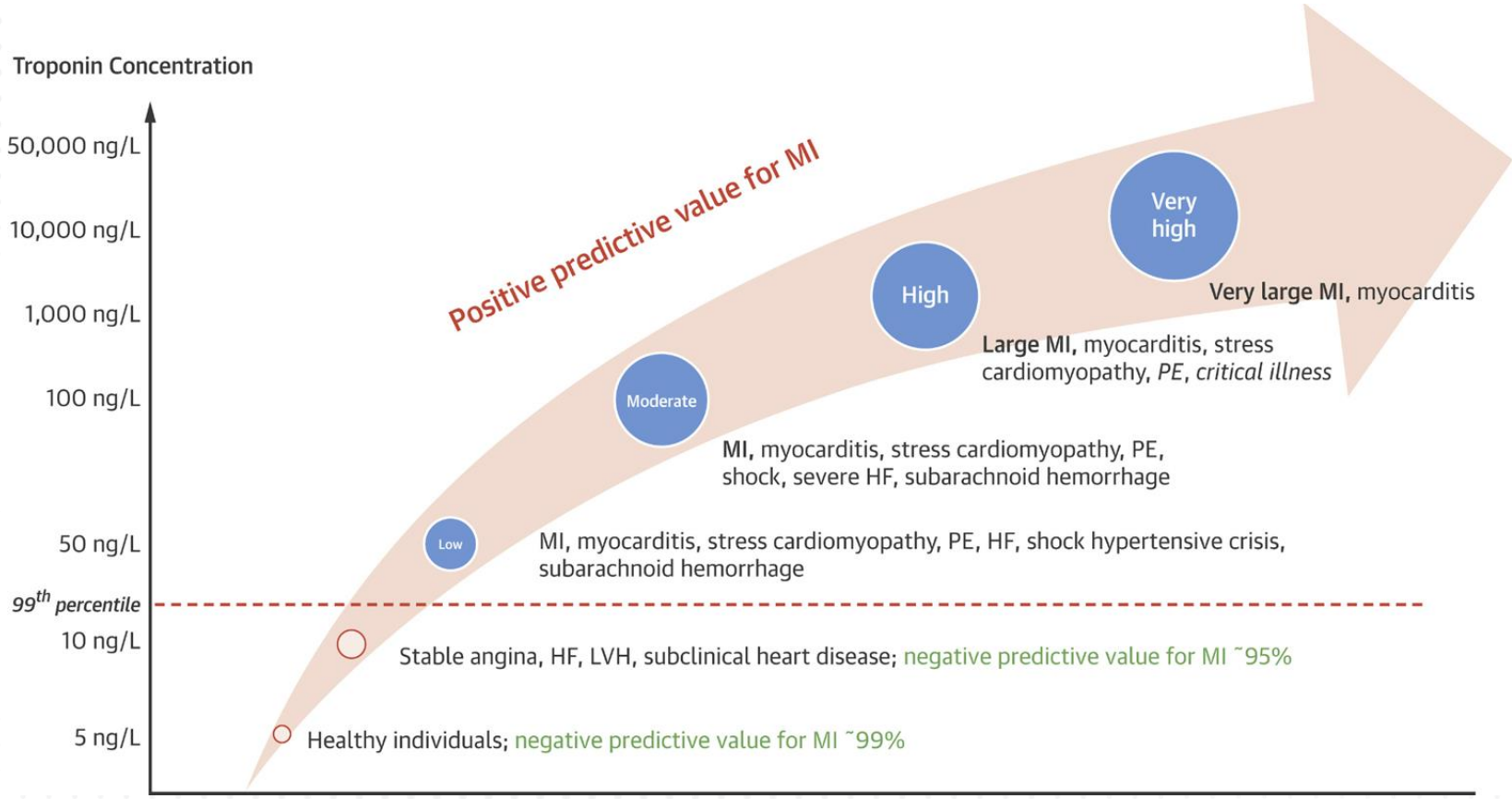

Troponin Concentration
50,000 ng/L
10,000 ng/L
1,000 ng/L
100 ng/L
50 ng/L
99th percentile
10 ng/L
5 ng/L
Positive predictive value for MI
Very high
High
Moderate
Low
Very large MI, myocarditis
Large MI, myocarditis, stress cardiomyopathy, PE, critical illness
MI, myocarditis, stress cardiomyopathy, PE, shock, severe HF, subarachnoid hemorrhage
MI, myocarditis, stress cardiomyopathy, PE, HF, shock hypertensive crisis, subarachnoid hemorrhage
Stable angina, HF, LVH, subclinical heart disease; negative predictive value for MI ~95%
Healthy individuals; negative predictive value for MI ~99%

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

These cut-offs apply irrespective of age 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 to these universal cut-offs.[35,36,69] The algorithms for additional assays are in development.

hs-cTn = high-sensitivity cardiac troponin; TBD = to be determined.[35–37,39,40,68,69,75–84]

Troponin results should always be used in conjunction with clinical signs and symptoms in accordance with the fourth universal definition of MI[16] requiring myocardial injury represented by a rise and/or fall of cTn values with at least one value above the 99th percentile URL and at least one of the following: symptoms of myocardial ischaemia, new ischaemic ECG changes, development of pathological Q waves, imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic aetiology, identification of a coronary thrombus by angiography or autopsy.

The results using the sex-specific 99th percentile cutoffs (female 17 ng/L, male 35 ng/L) are summarized in the following table.

Cutoff (ng/L)	Time Point[a]	n[b]	Sensitivity[c]		Specificity[d]		PPV[e]		NPV[f]	
			%	95% CI	%	95% CI	%	95% CI	%	95% CI
17 (Female only)	Baseline	412	95.8 (23/24)	78.9 - 99.9	87.6 (340/388)	83.9 - 90.7	32.4 (23/71)	21.8 - 44.5	99.7 (340/341)	98.4 - 100.0
	2 - 4 Hours	418	94.4 (17/18)	72.7 - 99.9	85.3 (341/400)	81.4 - 88.6	22.4 (17/76)	13.6 - 33.4	99.7 (341/342)	98.4 - 100.0
	4 - 9 Hours	372	94.1 (16/17)	71.3 - 99.9	82.8 (294/355)	78.5 - 86.6	20.8 (16/77)	12.4 - 31.5	99.7 (294/295)	98.1 - 100.0
35 (Male only)	Baseline	519	78.8 (52/66)	67.0 - 87.9	84.5 (383/453)	80.9 - 87.8	42.6 (52/122)	33.7 - 51.9	96.5 (383/397)	94.2 - 98.1
	2 - 4 Hours	526	90.0 (54/60)	79.5 - 96.2	86.1 (401/466)	82.6 - 89.1	45.4 (54/119)	36.2 - 54.8	98.5 (401/407)	96.8 - 99.5
	4 - 9 Hours	489	93.7 (59/63)	84.5 - 98.2	84.3 (359/426)	80.5 - 87.6	46.8 (59/126)	37.9 - 55.9	98.9 (359/363)	97.2 - 99.7

[a] All time points are relative to ED presentation / ED triage; baseline is within 2 hours of ED presentation / ED triage.

[b] Some time points could not be collected for some subjects.

Example Result

CHEMISTRY

Test Name	Result	ABN	Ref-Ranges	Units	Site
COLLECTED 12/05/22 16:41 RECEIVED 12/05/22 16:41 REPORTED 12/05/22 16:41					
CHEMISTRY					
HIGH SENSITIVITY TROPONIN I	13		<14	ng/L	M

THE STANDARD REFERENCE RANGE ABOVE DOES NOT HAVE CLINICAL SIGNIFICANCE FOR THIS ASSAY. PLEASE UTILIZE THE ACCELERATED DIAGNOSTIC PATHWAY FOR SUSPECTEDACUTE CORONARY SYNDROME AVAILABLE AT THE FOLLOWING URL TO INTERPRET. MOST NORMAL VALUES STILL REQUIRE A SERIAL TEST AND CALCULATION OF A HEAR(T) SCORE.
http://intranet1.mountsinai.org/epic/HighTroponin.asp

1. ACS RULE OUT ZONE: HEAR(T) score 0-3 AND initial Troponin <5 ng/L AND Troponin increase or decrease <2 ng/L at 1 hour repeat
2. ACS RULE IN ZONE: Troponin >/= 30 ng/L (female) or 63 ng/L (male); OR inital Troponin >/= 6 ng/L AND Troponin increase or decrease >/= 6 ng/L at 1 hour repeat.
3. NEITHER RULE IN OR OUT (i.e. - does not fit into either category above): Calculate HEAR(T) score and utilize algorithm linked above to interpret.

Please note : Effective December 8, 2022, Mount Sinai Clinical Laboratory will be switching from cTnI performed on Abbott Architect instruments to the high-sensitivity troponin I (hs-TnI) assay on Abbott Alinity instruments. This assay provides sex specific reference intervals. For questions regarding which sex-based cutoff to use, please refer to the {Accelerated Diagnostic Pathway for Suspected Acute Coronary Syndrome} at the URL above.

Definition of MI

The Fourth Joint European Society of Cardiology/American College of Cardiology/American Heart Association/World Heart Foundation Task Force for the Universal Definition of MI has stated:

"**diagnosis of acute myocardial infarction (AMI) can be made based on a rise or fall of troponin, with at least 1 measurement exceeding the 99th percentile of a normal population (indicating the presence of myocardial injury), *plus* reasonable suspicion for coronary ischemia (e.g., typical symptoms, changes on electrocardiography, evidence for loss of myocardial function, or demonstration of obstructive coronary artery disease on ECHO, cath or autopsy)**"

Risk Stratification

Mount Sinai

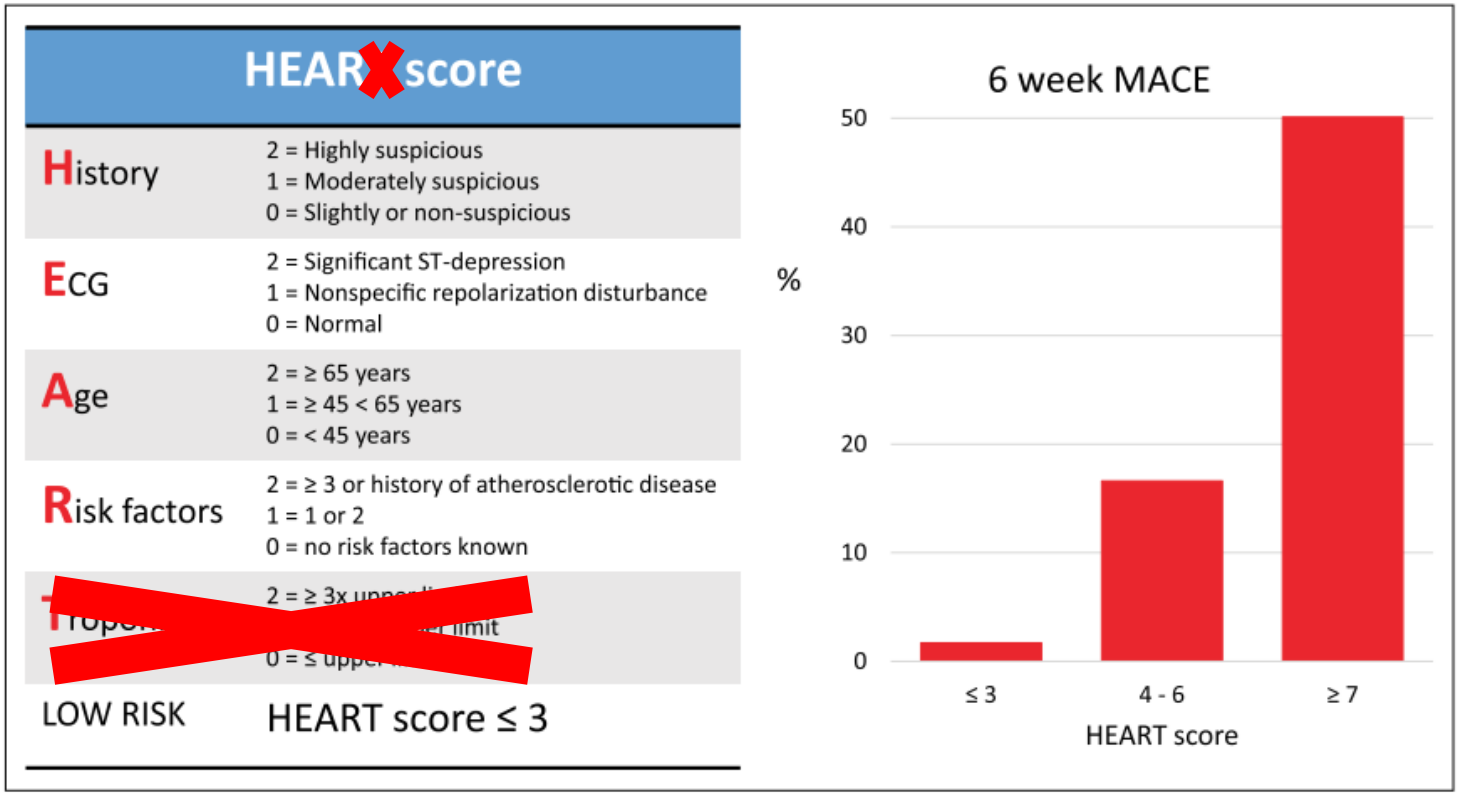


Figure 2. Calculation of the HEART score and incidence of 6-week major adverse cardiac events (MACE) according to the HEART score as tested in a large population of patients presenting with chest pain in the emergency department.[27]

HEART Pathway (HEAR Score + serial trop)

Improves sensitivity and NPV of HEART score

In a prospective study- HEART Pathway identified 30.7% of patients as low risk with an NPV of 99.6% for 30-day death or MI

HEAR(T) score 0-3 and serial neg trop

→ low risk + safe for dc

Accelerated Diagnostic Pathway for Suspected ACS

Mount Sinai

ADP Goals

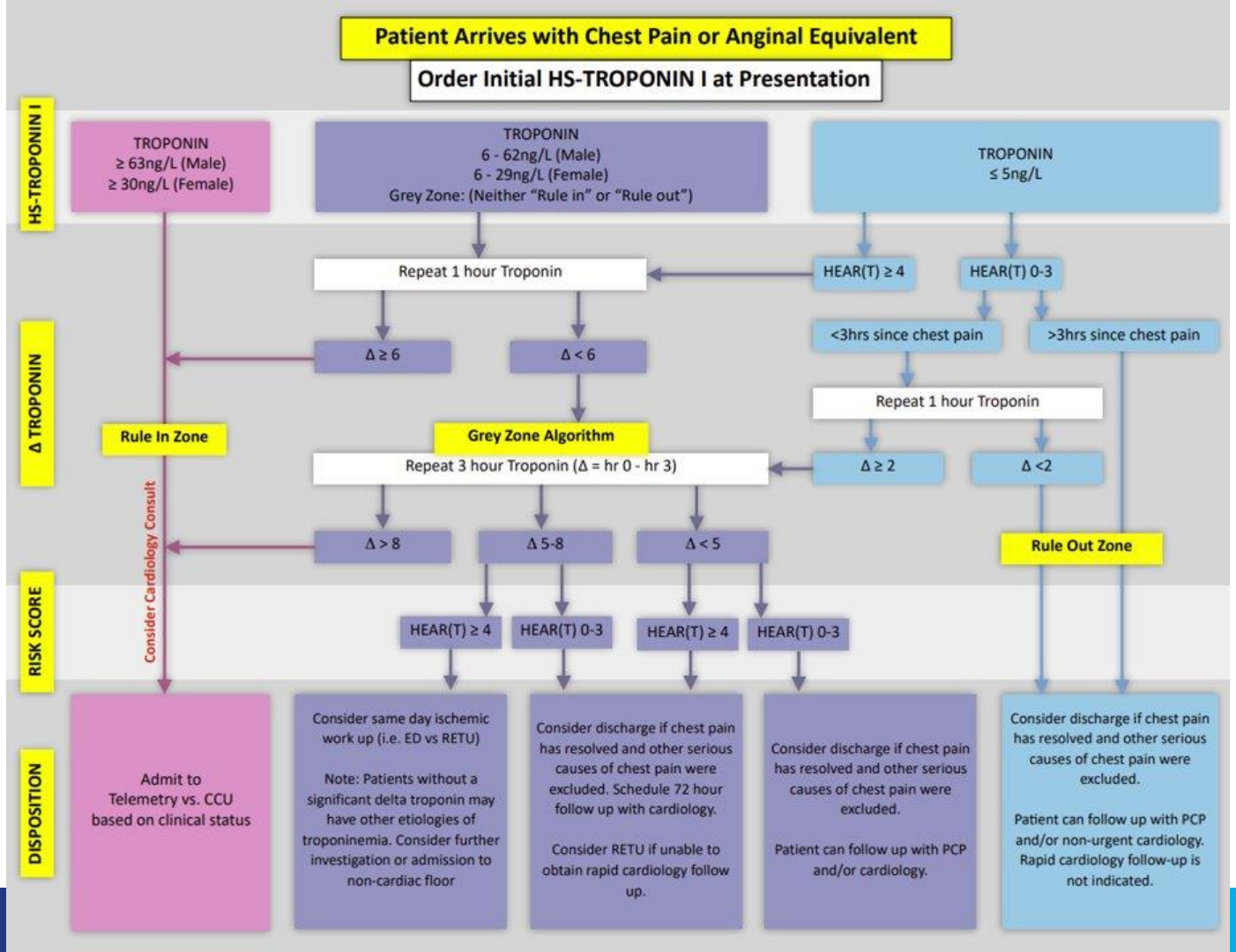
- High sensitivity and NPV for MI
- **Identification of patients at low-risk for MACE for early discharge**
- Allow for ACS to be quickly ruled out or ruled in
- Improve health system resource utilization (increased rate of discharge of low-risk patients, decrease ED LOS)

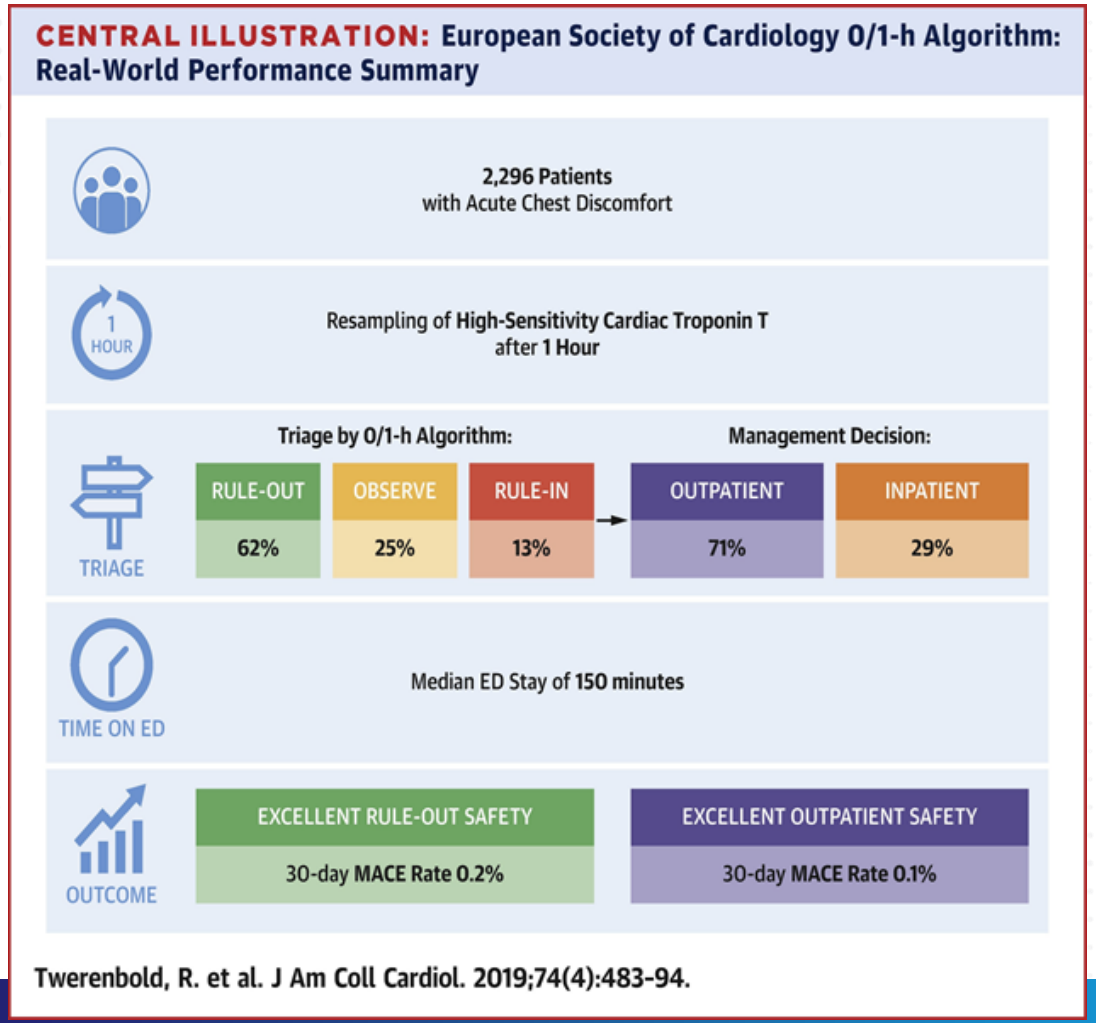
TABLE 2 Summary of hs-cTn Rapid Rule-Out and Rule-In Accelerated Diagnostic Panels

	0/3h	High STEACS	0/2h	0/1h
Rule-out criteria				
hs-cTnT	<14 ng/l at 0 and 3 h* and GRACE score <140	NA	<14 ng/l at 0 and 2 h and Δ <4 ng/l	<12 ng/l at 0 and 1 h Δ <3 ng/l
hs-cTnI†	<26 ng/l at 0 and 3 h* and GRACE score <140	<5 ng/l at 0 h or a 3-h value: <16 ng/l in women <34 ng/l in men and Δ <3 ng/l	<6 ng/l at 0 and 2 h and Δ <2 ng/l	<5 ng/l at 0 and 1 h Δ <2 ng/l
NPV for MI	98.3%-100%	99.5%	99.4%- 99.9%	98.9%-100%
Sensitivity for MI	98.9%-100%	97.7%	96.0%-99.6%	96.7%-100%
Proportion ruled out	39.8%-49.1%	74.2%	56.0%-77.8%	47.9%-64.2%
Rule-in criteria				
hs-cTnT	>14 ng/l at 0 or 3 h	N.A.	≥53 ng/l at 0 h or ≥10 ng/l Δ at 2 h	≥52 ng/l at 0 h or 1 h Δ ≥ 5 ng/l
hs-cTnI	>26 ng/l at 0 or 3 h	>16 ng/l in women >34 ng/l in men at 0 or 3 h	≥64 ng/l at 0 h or ≥15 ng/l Δ at 2 h	≥52 ng/l at 0 h or 1 h Δ > 6 ng/l
PPV for MI	72.0%-83.5%	59.5%	75.8%-85.0%	63.4%-84.0%
Specificity for MI	96.7%-98.2%	87.6%	95.2%-99.0%	93.8%-97%
Proportion ruled-in	9.7%%-38.2%	22.0%	7.7%-16.7%	13.1%-23.0%

*In patients with ≥6 h of pain, only a single value below this threshold is required. †Abbott ARCHITECT hs-cTnI.

0/1h = accelerated diagnostic protocol to rule out MI in patients presenting >3 h from symptoms using a single hs-cTn measurement at presentation, whereas for other patients, an absolute hs-cTn at presentation and 1-h delta are used to rule out or rule in MI or to place patients in an observational zone; 0/2h = accelerated diagnostic protocol that uses maximal levels and absolute delta hs-cTnI or T concentrations at 0 and 2 h to rule out or rule in MI or place patients in an observational zone; 0/3h = accelerated diagnostic protocol that incorporates hs-cTn at 0 and 3 h, hs-cTn change, and time since pain onset to determine which patients are appropriate for discharge or stress testing versus invasive management; GRACE = Global Registry of Acute Coronary Events; High STEACS = High-Sensitivity Troponin in the Evaluation of Patients With Acute Coronary Syndrome; hs-cTnI = high-sensitivity cardiac troponin I; hs-cTnT = high-sensitivity cardiac troponin T; MI = myocardial infarction; NA = not applicable; NPV = negative predictive value; PPV = positive predictive value.


Patient Arrives with Chest Pain or Anginal Equivalent
Order Initial HS-TROPONIN I at Presentation
HS-TROPONIN I
Δ TROPONIN
RISK SCORE
DISPOSITION
TROPONIN ≥ 63ng/L (Male) ≥ 30ng/L (Female)
TROPONIN 6 - 62ng/L (Male) 6 - 29ng/L (Female) Grey Zone: (Neither "Rule in" or "Rule out")
TROPONIN ≤ 5ng/L
Repeat 1 hour Troponin
HEAR(T) ≥ 4
HEAR(T) 0-3
<3hrs since chest pain
>3hrs since chest pain
Δ ≥ 6
Δ < 6
Repeat 1 hour Troponin
Rule In Zone
Grey Zone Algorithm
Repeat 3 hour Troponin (Δ = hr 0 - hr 3)
Δ ≥ 2
Δ <2
Consider Cardiology Consult
Δ > 8
Δ 5-8
Δ < 5
Rule Out Zone
HEAR(T) ≥ 4
HEAR(T) 0-3
HEAR(T) ≥ 4
HEAR(T) 0-3
Admit to Telemetry vs. CCU based on clinical status
Consider same day ischemic work up (i.e. ED vs RETU)
Note: Patients without a significant delta troponin may have other etiologies of troponinemia. Consider further investigation or admission to non-cardiac floor
Consider discharge if chest pain has resolved and other serious causes of chest pain were excluded. Schedule 72 hour follow up with cardiology.
Consider RETU if unable to obtain rapid cardiology follow up.
Consider discharge if chest pain has resolved and other serious causes of chest pain were excluded.
Patient can follow up with PCP and/or cardiology.
Consider discharge if chest pain has resolved and other serious causes of chest pain were excluded.
Patient can follow up with PCP and/or non-urgent cardiology. Rapid cardiology follow-up is not indicated.



Twerenbold, R. et al. J Am Coll Cardiol. 2019;74(4):483-94.

0.2% MACE rate in patients ruled out by 2 trop algorithm (0/1 hr)

0.1% MACE rate in patients safe for outpatient evaluation

TABLE 8 Definition Used for Low-Risk Patients With Chest Pain

	Low Risk (<1% 30-d Risk for Death or MACE)
hs-cTn Based	
T-0	T-0 hs-cTn below the assay limit of detection or "very low" threshold if symptoms present for at least 3 h
T-0 and 1- or 2-h Delta	T-0 hs-cTn and 1- or 2-h delta are both below the assay "low" thresholds (>99% NPV for 30-d MACE)
Clinical Decision Pathway Based	
HEART Pathway (20)	HEART score ≤3, initial and serial cTn/hs-cTn < assay 99th percentile
EDACS (14)	EDACS score ≤16; initial and serial cTn/hs-cTn < assay 99th percentile
ADAPT (21)	TIMI score 0, initial and serial cTn/hs-cTn < assay 99th percentile
mADAPT	TIMI score 0/1, initial and serial cTn/hs-cTn < assay 99th percentile
NOTR (15)	0 factors

ADAPT indicates 2-hour Accelerated Diagnostic Protocol to Access Patients with Chest Pain Symptoms Using Contemporary Troponins as the Only Biomarkers; cTn, cardiac troponin; EDACS, Emergency Department Acute Coronary Syndrome; HEART Pathway, History, ECG, Age, Risk Factors, Troponin; hs-cTn, high-sensitivity cardiac troponin; MACE, major adverse cardiovascular events; mADAPT, modified 2-hour Accelerated Diagnostic Protocol to Access Patients with Chest Pain Symptoms Using Contemporary Troponins as the Only Biomarkers; NOTR, No Objective Testing Rule; NPV, negative predictive value; and TIMI, Thrombolysis in Myocardial Infarction.

Approach to patients with chronic elevations in troponin (CKD/ESRD, HF, etc…)

There is a challenge of interpreting elevated sensitivity troponin values in those who have a high value that is not directly related to myocardial injury

Review

High-sensitivity troponin in chronic kidney disease: Considerations in myocardial infarction and beyond

Anthony (Ming-yu) Chuang[1,2,*], Mau T Nguyen[3], Woon-Man Kung[4], Sam Lehman[1,2] and Derek P Chew[1,2]

Invited Commentary

June 7, 2021

High-Sensitivity Cardiac Troponin Assay in Patients With Kidney Impairment

A Challenge to Clinical Implementation

Approach to patients with chronic elevations in troponin (CKD/ESRD, HF, etc…)

There is little guidance from current literature, but these recommendations may assist in delineating between Type I vs II MI:

Providers should rely on the pretest probability of myocardial injury, incorporating risk factors, medical history, and clinical gestalt

If >/= 20% change in prior Hs-trop value or initial measurement >99% percentile consider MI as higher on differential with consideration of cardiology consult

If no prior comparison or if initial troponin is <99% but clinical suspicion is high, consider obtaining serial troponin measurements = Delta value

Key Info

Clinical judgement always supersedes ADP

Must be in separate **green tube**

Shared Decision Making

Mount Sinai

What's Next?

Prepared for: _____

1 Your Chest Pain Diagnosis

Your initial test results are NEGATIVE for a heart attack. These included:

- Blood tests to look for an enzyme called troponin that is released when the heart muscle is damaged. Additional troponin tests may be done to monitor you for heart attack during your emergency visit.
- An electrocardiogram to check whether your heart is getting enough oxygen and blood.

However, the chest pain you are experiencing today may be a warning sign for a future heart attack.

2 What You Can Do

A STRESS TEST, which views blood flow to your heart at rest and under stress may be needed.

Examining your risk will help you and your clinician decide together whether or not you should have additional heart testing.

3 Your Personal Risk Evaluation

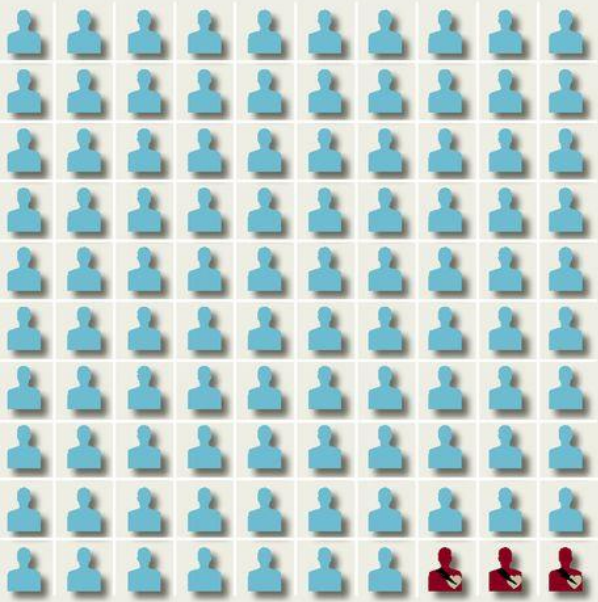
Your risk of having a heart or pre-heart attack within the next 45 days can be determined by comparing you to people with similar factors[2] who also came to the Emergency Department with chest pain.

4 Would you prefer to have a stress test during this emergency visit or decide later during an outpatient appointment?

- ☐ I would like to have a stress test during my emergency visit. I realize that this may increase the cost of my care and/or lengthen my stay.
- ☐ I would like to be seen by a heart doctor within 24-72 hours and would like assistance in scheduling this appointment.
- ☐ I would like to schedule an appointment on my own to consult with my primary care physician.
- ☐ I would like my Emergency Department doctor to make this decision for me.

Of every **100** people like you who came to the Emergency Department with chest pain...

3 had a heart or a pre-heart attack within 45 days of their Emergency Department visit, **97** did not.



[1] Stress test options include nuclear stress testing, ultrasound stress testing, or exercise ECG (electrocardiogram) stress testing. Nuclear stress testing involves exposure to radiation which has been shown to be related to increased cancer risk over a lifetime. Your doctor can help you explore which option may be best for you.

[2]
- Age
- Gender
- Race
- If chest pain is made worse when manual pressure is applied to the chest area
- If there is a history of coronary artery disease
- If the chest pain causes perspiration
- Findings on electrocardiograms (electronic tracings of the heart)
- Initial cardiac troponin result

Takeaway Points

1

High Sensitivity Troponin rollout: December 8, 2022 at MSH

2

Discharge low-risk patients with CP >3 hour in ~1 hour

3

Know your assay specific cutoffs and how to interpret

References

Collet JP, Thiele H, Barbato et al. 2020 ESC Guidelines for the Management of Acute Coronary Syndromes in Patients Presenting Without Persistent ST-Segment Elevation: The Task Force for the Management of Acute Coronary Syndromes in Patients Presenting Without Persistent ST-Segment Elevation of the European Society of Cardiology (ESC). *Eur Heart J* 2020; Aug 29:1-79

Diagnosis and risk stratification of chest pain patients in the emergency department: focus on acute coronary syndromes. A position paper of the Acute Cardiovascular Care Association. https://pubmed.ncbi.nlm.nih.gov/31958018/

2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain. https://www.jacc.org/doi/pdf/10.1016/j.jacc.2021.07.053

Januzzi JL Jr, Mahler SA, Christenson RH, Rymer J, Newby LK, Body R, Morrow DA, Jaffe AS. Recommendations for Institutions Transitioning to High-Sensitivity Troponin Testing: JACC Scientific Expert Panel. J Am Coll Cardiol. 2019 Mar 12;73(9):1059-1077. doi: 10.1016/j.jacc.2018.12.046. Epub 2019 Feb 21. PMID: 30798981.

Outcome of Applying the ESC 0/1-hour Algorithm in Patients With Suspected Myocardial Infarction. https://www.sciencedirect.com/science/article/pii/S0735109719353811

Shared decision making in patients with low risk chest pain: prospective randomized pragmatic trial. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5152707/figure/f1/

Raphael Twerenbold, Jasper Boeddinghaus, Thomas Nestelberger, Karin Wildi, Maria Rubini Gimenez, Patrick Badertscher, Christian Mueller, Clinical Use of High-Sensitivity Cardiac Troponin in Patients With Suspected Myocardial Infarction. Journal of the American College of Cardiology,Volume 70, Issue 8,2017,Pages 996-1012,ISSN 0735-1097, https://doi.org/10.1016/j.jacc.2017.07.718.

Ada S Cheung, Hui Yin Lim, Teddy Cook, Sav Zwickl, Ariel Ginger, Cherie Chiang, Jeffrey D Zajac, Approach to Interpreting Common Laboratory Pathology Tests in Transgender Individuals, *The Journal of Clinical Endocrinology & Metabolism*, Volume 106, Issue 3, March 2021, Pages 893–901, https://doi.org/10.1210/clinem/dgaa546

MC Bezuidenhout, M Conradie-Smit, E de Vries, JA Dave, IL Ross, AE Zemlin. (2022) Correspondence: Role of clinical laboratories in reporting results of transgender individuals on hormonal therapy by Phiri-Ramongane and Khine. *Journal of Endocrinology, Metabolism and Diabetes of South Africa* 0:0, pages 1-2.

Greene DN, Schmidt RL, Christenson RH, et al. Distribution of High-Sensitivity Cardiac Troponin and N-Terminal Pro–Brain Natriuretic Peptide in Healthy Transgender People. JAMA Cardiol. 2022;7(11):1170–1174. doi:10.1001/jamacardio.2022.3299