Dolore Toracico e Livelli di Troponina non Misurabili

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Rapid Exclusion of Acute Myocardial Infarction in Patients With Undetectable Troponin Using a High-Sensitivity Assay

Table 3 Evaluation of hs-cTnT Use in Clinical Practice: Diagnostic Performance of Initial hs-cTnT Level for Predicting Any Subsequent hs-cTnT Elevation

hs-cTnT Cutoff	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)
3 ng/l	99.8 (99.1–100.0)	49.5 (43.9–55.1)	78.5 (75.4–81.4)	99.4 (96.6–100.0)
14 ng/l	98.4 (97.0–99.3)	87.9 (84.0–91.1)	92.8 (90.4–94.7)	97.2 (94.7–98.7)

Conclusions: undetectable hs-cTnT at presentation has very high NPV, which may be considered to rule out AMI, identifying patients at low risk of adverse events.

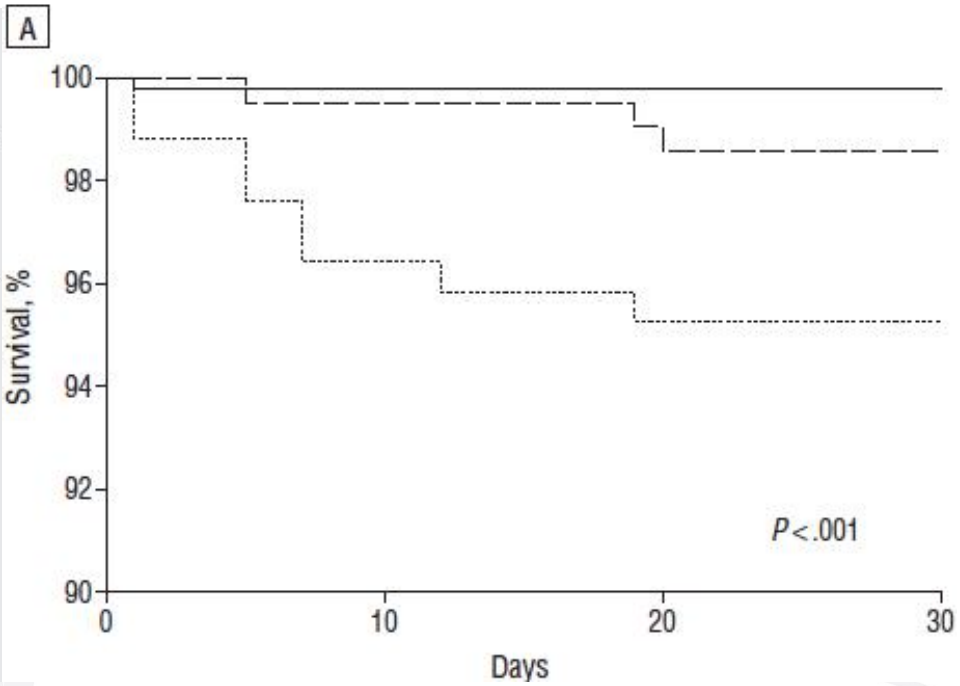
This **strategy may reduce the need for serial testing** and empirical treatment, enabling earlier reassurance for pts and fewer unnecessary evaluations and hospital admissions.

Body R. **J Am Coll Cardiol** 2011

One-Hour Rule-out and Rule-in of Acute Myocardial Infarction Using High-Sensitivity Cardiac Troponin T

Table 3. Performance of the hs-cTnT Algorithm for Rule-in and Rule-out of AMI

	Overall Cohort (n = 872)	Derivation Cohort (n = 436)	Validation Cohort (n = 436)
Patients diagnosed after 1 h, No. (%)	660 (76)	325 (75)	335 (77)
Rule-out			
Sensitivity, %	100	100	100
Negative predictive value, %	100	100	100
Rule-in			
Specificity, %	94	92	97
Positive predictive value, %	76	69	84



Tobias Reichlin *(Basel)* **Ann Intern Med** 2012

Multicenter Evaluation of a 0-Hour/1-Hour Algorithm in the Diagnosis of Myocardial Infarction With High-Sensitivity Cardiac Troponin T

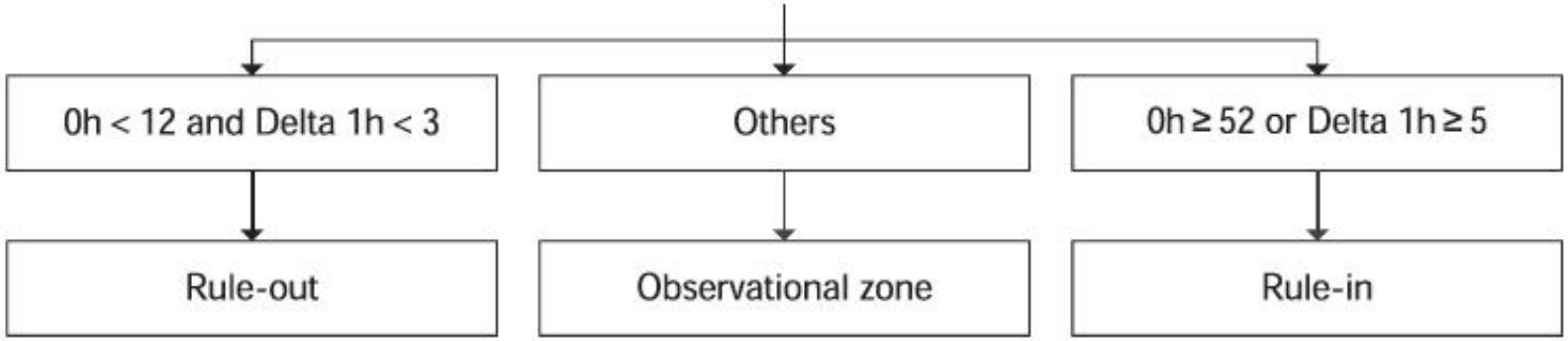


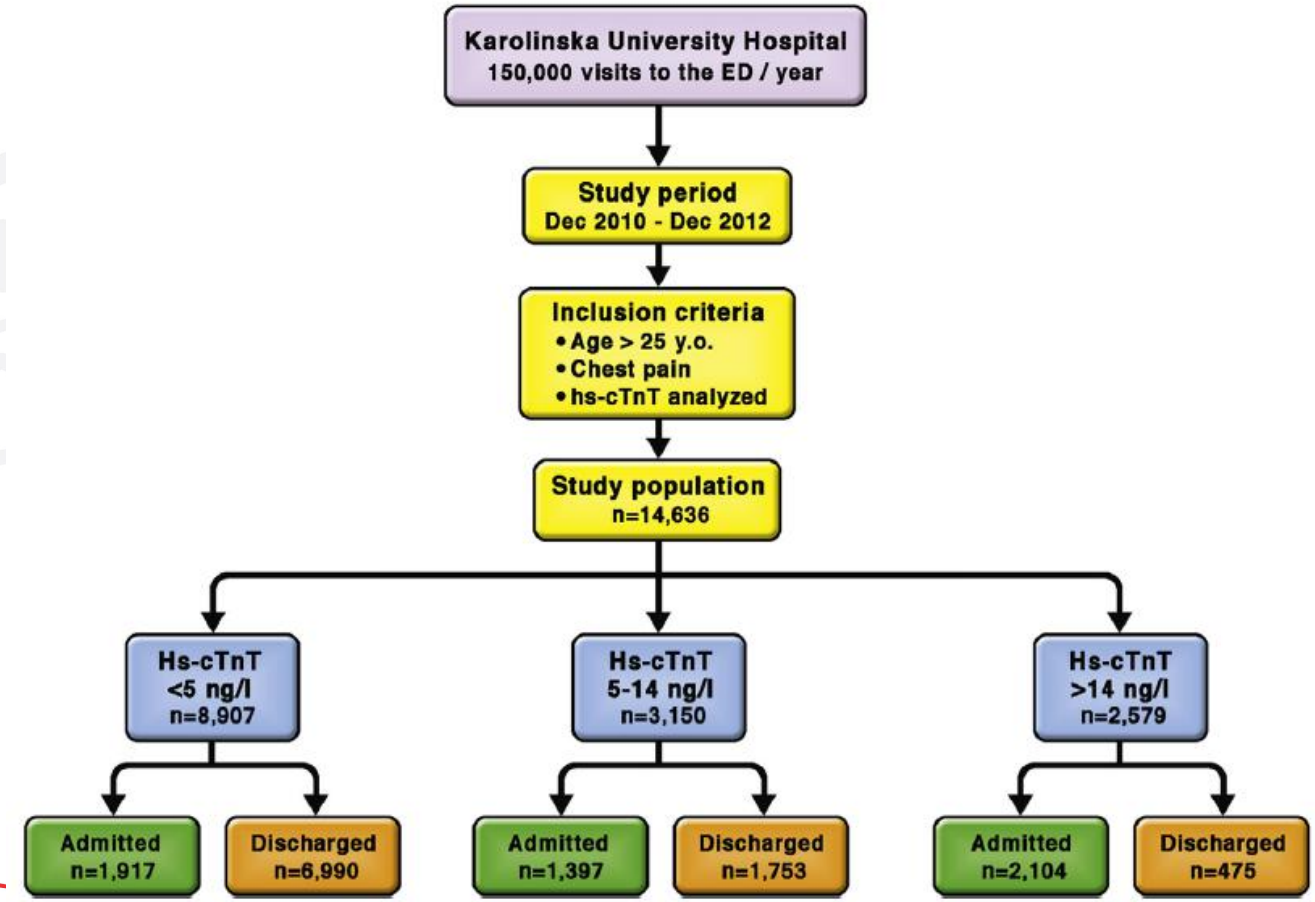
Figure 1. Hs-cTnT 0-hour/1-hour algorithm. Values for hs-cTnT are shown in nanograms per liter.

Hs-cTn at presentation and 1 hour later in a population with a 17% rate of AMI classified **63% of patients as having no AMI**, with a **99.1%** NPV (95% CI **98.2% to 99.7**%);

14% as having AMI, with a PPV of 77% (95% CI 70.4% to 83.0%); and 22.5% as having an indeterminate classification after 1 hour of testing.

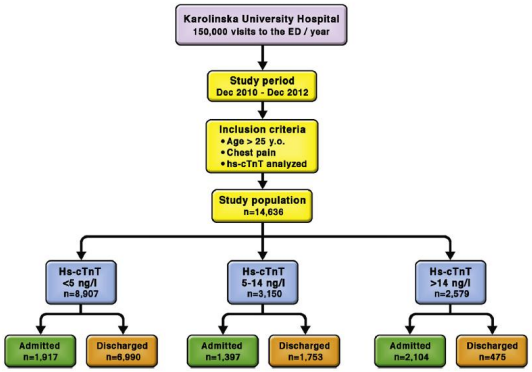
C. Muller for the **TRAPID AMI invest**. *Ann Emerg Med* 2016

Undetectable High-Sensitivity Cardiac Troponin T Level in the Emergency Department and Risk of Myocardial Infarction



Bandstein Nadia (*Stockholm*) et al. **JACC** 2014

Undetectable High-Sensitivity Cardiac Troponin T Level in the Emergency Department and Risk of Myocardial Infarction



- 8,907 / 14,636 (61%) had an initial hs-cTnT of <5 ng/l; 21% had 5 to 14 ng/l, and 18% had >14 ng/l.
- **At 30-day follow-up,** 39 (0.44%) pts with undetectable hs-cTnT had a MI. The NPV for MI within 30 days was **99.8%** (95% CI: **99.7 to 99.9**). The NPV for death was 100% (95% CI: 99.9 to 100).

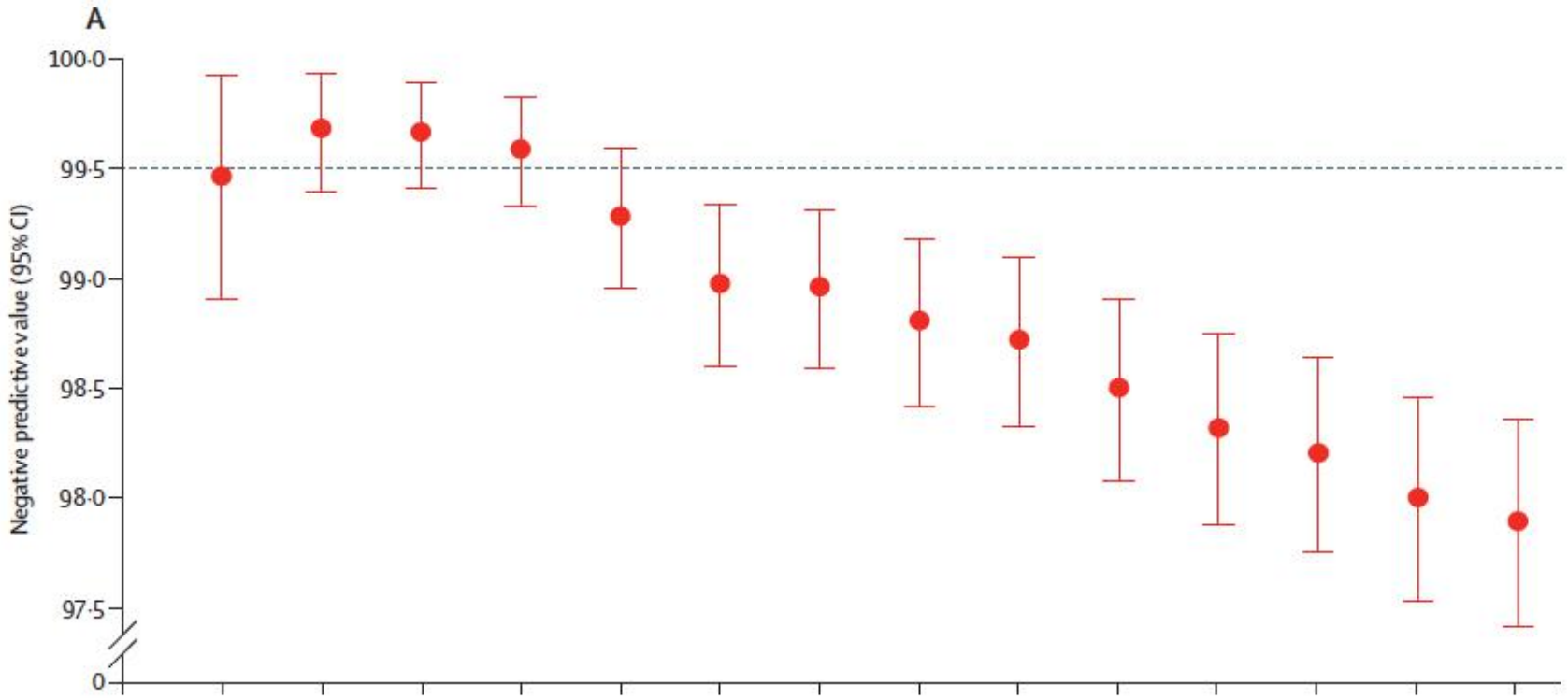
Bandstein N et al. JACC 2014

High-sensitivity cardiac troponin I at presentation in patients with suspected acute coronary syndrome: a cohort study.

- In pts without MI at presentation, troponin was <5 ng/L in 2311 (61%) of 3799 patients, with a NPV of 99·6% (95% CI 99·3–99·8**)** for the primary outcome.
- The NPV value was consistent across groups stratified by age, sex, risk factors, and previous cardiovascular disease.
- In two independent validation cohorts, **troponin was <5 ng/L in 594 (56%) of 1061 patients, with an overall NPV of 99·4% (98·8–99·9)**.

Anoop S V Shah. **Lancet** 2015

High-sensitivity cardiac troponin I at presentation in patients with suspected acute coronary syndrome: a cohort study



Anoop S V Shah et al. **Lancet** 2015

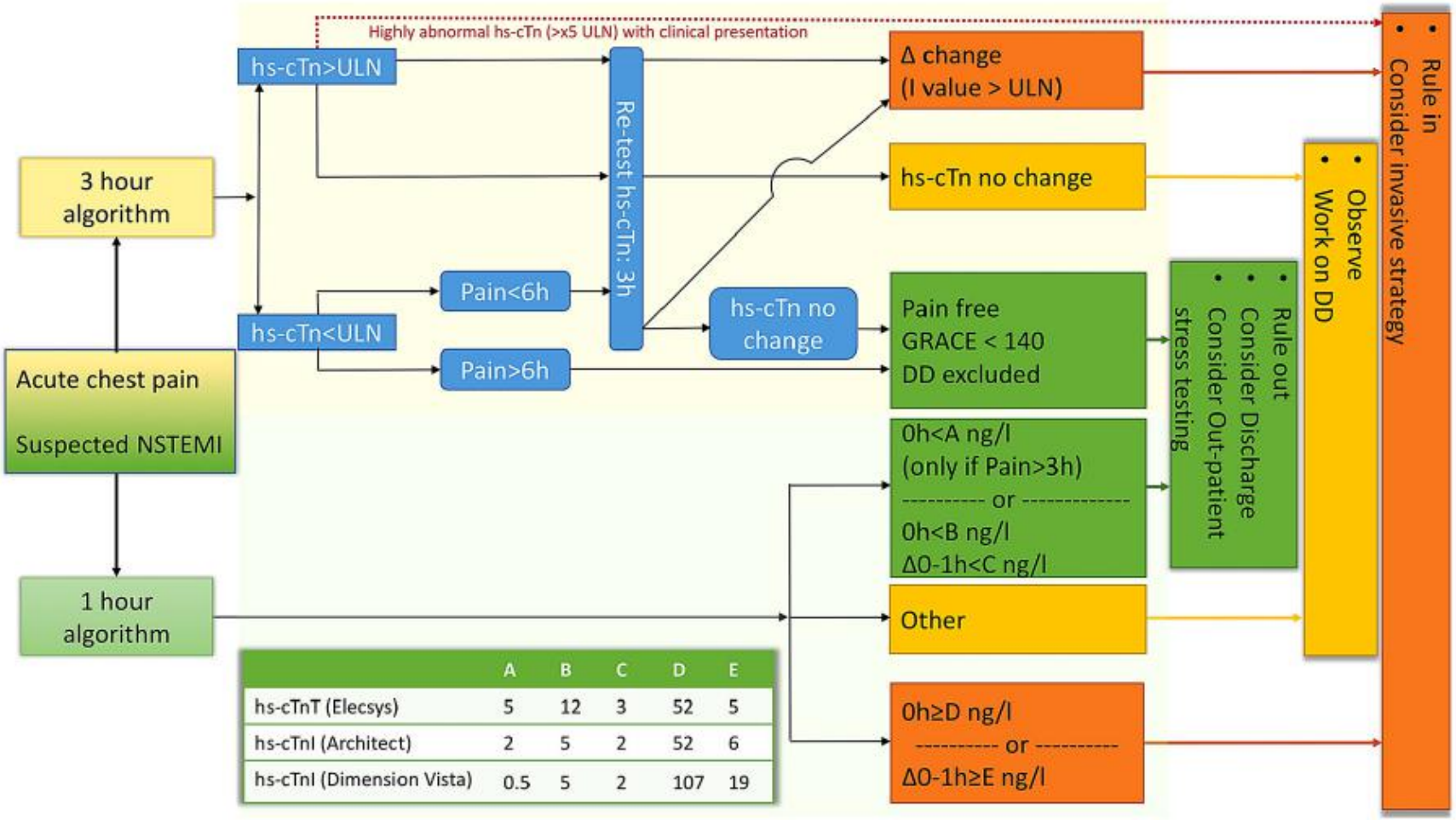
High-sensitivity cardiac troponin I at presentation in patients with suspected acute coronary syndrome: a cohort study

R. Body, C. Mueller, E. Giannitsis, M. Christ, J. Ordonez-Llanos, C R. de Filippi, R. Nowak, M. Panteghini, T. Jernberg, M. Plebani, F. Verschuren, JK. French, R. Christenson, S. Weiser, G. Bendig, P. Dilba and B. Lindahl, for the TRAPID-AMI Investigators

Results: We included 1,282 patients, of whom 213 (16.6%) had AMI and 231 (18.0%) developed MACE.
Of 560 (43.7%) pts with initial hs-cTnT levels below the LoD (5 ng/L), 4 (0.7%) had AMI. In total, 471 (36.7%) patients had both initial hs-cTnT levels below the LoD and no ECG ischemia. These patients had a 0.4% (n = 2) probability of AMI, giving 99.1% (95% CI 96.7% to 99.9%) sensitivity and 99.6% (95% CI = 98.5% to 100.0%) NPV. The incidence of MACE in this group was 1.3% (95% CI = 0.5% to 2.8%).

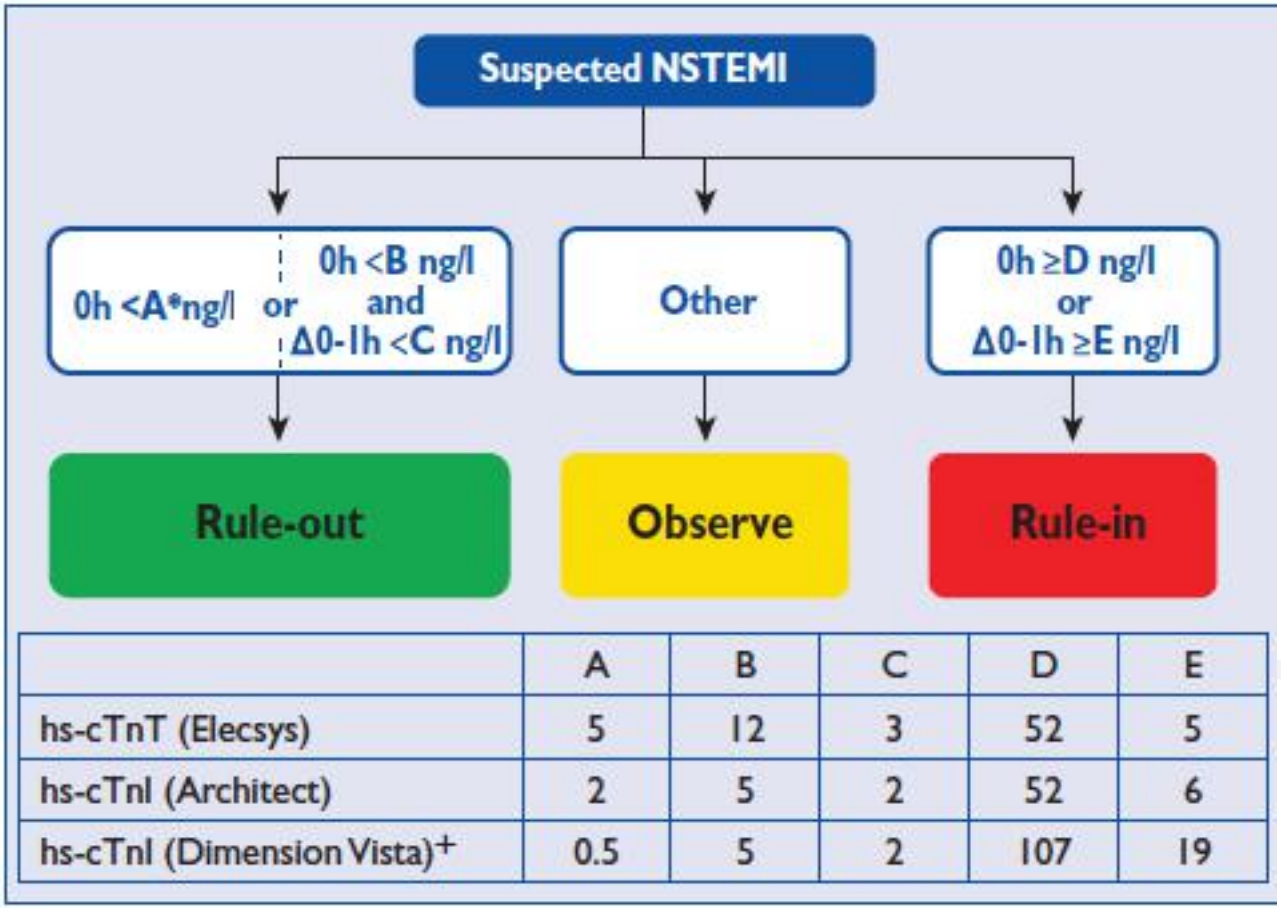
Body R for the TRAPID Invest. ***Acad Emerg Med*** 2015

Hs-cTn: Algorithm for AMI Rapid Rule-in/Rule-out



	A	B	C	D	E
hs-cTnT (Elecsys)	5	12	3	52	5
hs-cTnI (Architect)	2	5	2	52	6
hs-cTnI (Dimension Vista)	0.5	5	2	107	19

European Heart Journal (2016) **37**, 267–315
doi:10.1093/eurheartj/ehv320



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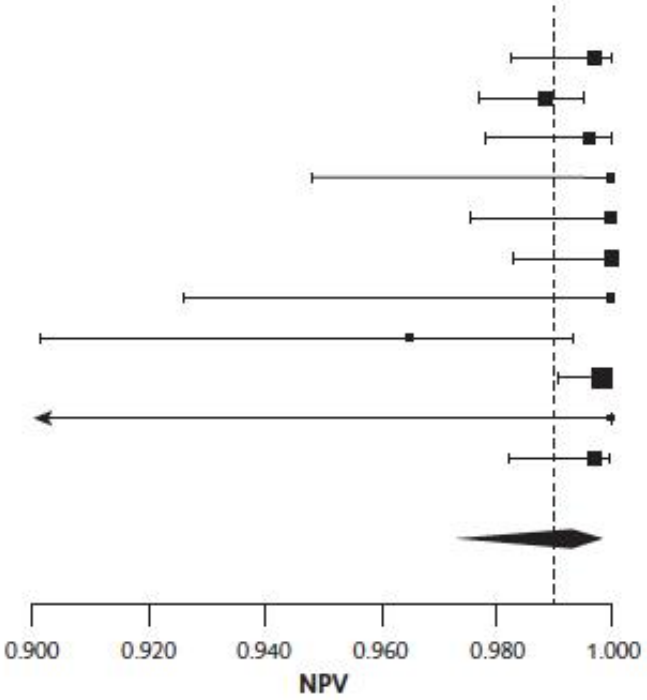
hs-cTnT (Elecsys)	5	12	3	52	5
hs-cTnI (Architect)	2	5	2	52	6
hs-cTnI (Dimension Vista)+	0.5	5	2	107	19

Marco Roffi et al. ***Eur Heart*** J 2016

Rapid Rule-out of Acute Myocardial Infarction With a Single High-Sensitivity Cardiac Troponin T Measurement Below the Limit of Detection. A Collaborative Meta-analysis

Cohort, Year (Reference)	Prevalence, %	TN/(TN+FN)	NPV (95% CI)
Lund, 2016 (26)	7	339/340	0.997 (0.983–1.000)
RATPAC, 2011 (21)	8	605/612	0.989 (0.977–0.995)
ADAPT–Brisbane, 2012 (20)	8.1	269/270	0.996 (0.978–1.000)
Nelson, 2015 (22)	9.7	80/80	1.000 (0.948–1.000)
Paris, 2011 (25)	10.5	156/156	1.000 (0.976–1.000)
Manchester, 2011 (4)	12.7	232/232	1.000 (0.983–1.000)
Leeuwarden, 2016 (27)	13	56/56	1.000 (0.926–1.000)
Montpellier, 2013 (23)	14.5	83/86	0.965 (0.901–0.993)
APACE, 2009 (19)	20.8	627/628	0.998 (0.991–1.000)
Heidelberg, 2015 (24)	22	25/25	1.000 (0.817–1.000)
ADAPT–Christchurch, 2012 (20)	23.3	339/340	0.997 (0.983–1.000)
Summary estimates			0.993 (0.973–0.998)



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***Pickering* John**, *(Otago Univ, NZ) J Ann Intern Med* 2017

The organisational value of diagnostic strategies using high-sensitivity troponin for patients with possible acute coronary syndromes: a trial-based cost-effectiveness analysis

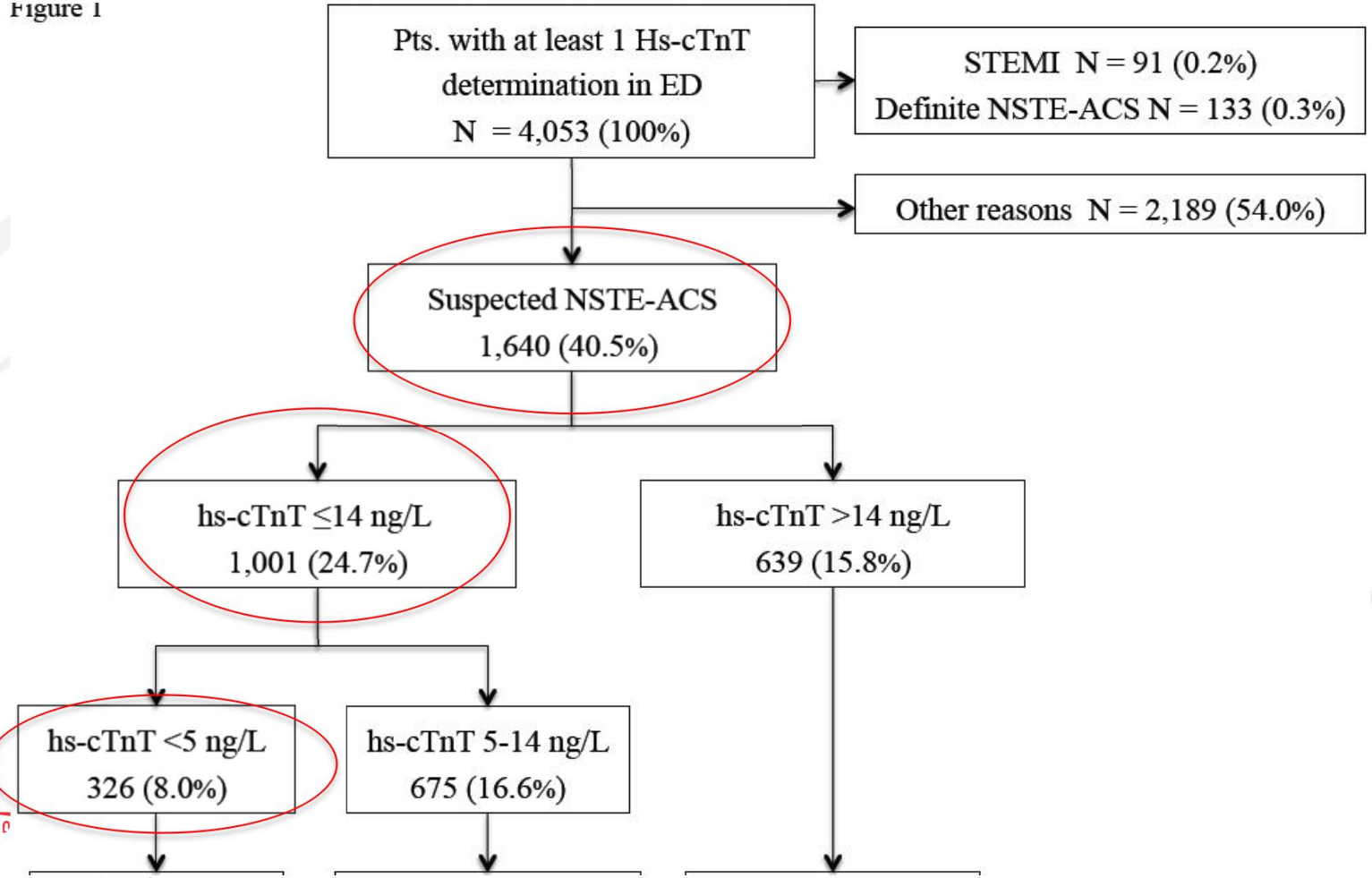
Results hs-Tn I-supported algorithms increased diagnostic accuracy from 90.0% to 94.0% with an average cost reduction per pt. of $490. Additional criteria for accelerated rule-out (which included limit of detection and the modified 2-hour ADAPT trial rules) avoided 7.5% of short- stay unit admissions or 25% of admissions to a cardiac ward, overnight stays decreased up to 43%; no difference was found for patients with ACS

Conclusions hs-TnI algorithms are cost-effective on a hospital level compared with sensitive troponin protocols. Implementation could improve referral accuracy or facilitate safe discharge. **It would decrease costs and provide significant hospital benefits.**

Julicker P, et al. **BMJ Open** 2017

Rapid rule-out of suspected ACS in the ED by high-sensitivity cardiac Troponin T levels at presentation .

Figure 1



Fabbri A et al. submitted

Rapid rule-out of suspected ACS in the ED by high-sensitivity cardiac Troponin T levels at presentation .

Outcome measures	<5 ng/L (N = 326)	5 – 14 ng/L (N = 675)
30 days		
Fatal or Non-fatal MI		
No. of cases (% with 95% CI)	0	12 (1.8%; 1.0% - 3.0%)
NPV	**100%**	98.2% (98.1% - 98.3%)

Fabbri et al. submitted

30 day fatal MI or non-fatal MI after discharge from ED following negative chest pain pathway.

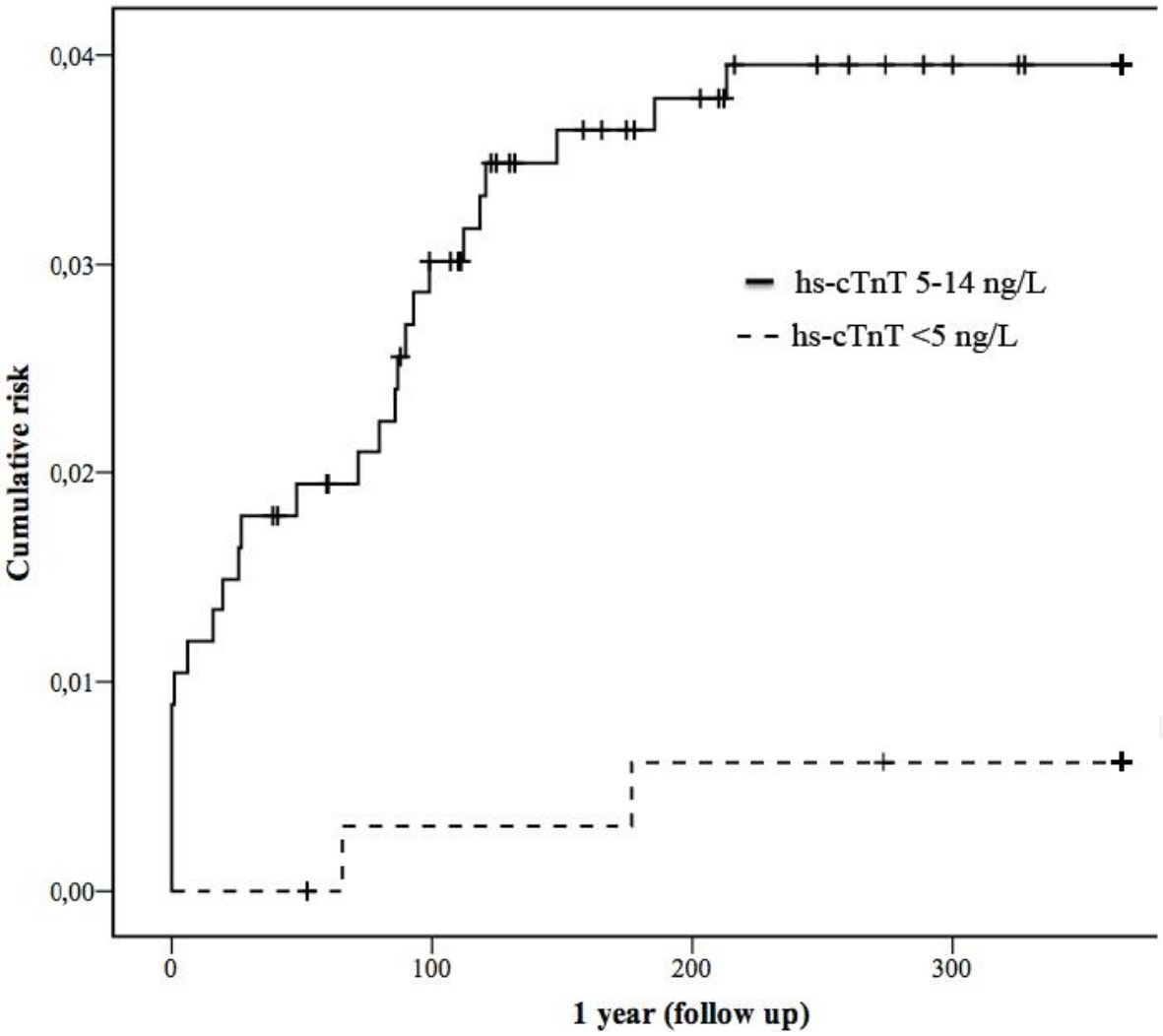
Sex	Age	Grace Score	Symptoms onset to sampling time	1-st hs-cTnT	2-nd hs-cTnT	Censor	Outcome measure
M	77	95	3.10	12	10	16	Non-fatal MI
M	54	81	3.30	14	22	0	Non-fatal MI
M	85	131	4.00	8	11	26	Fatal MI
M	53	64	3.20	14	15	20	Non-fatal MI
F	78	95	3.20	14	37	0	Non-fatal MI
M	53	81	6.10	14	16	27	Non-fatal MI
M	67	111	4.20	13	16	0	Non-fatal MI
M	70	134	4.10	11	19	0	Non-fatal MI
M	84	144	7.20	14	396	0	Non-fatal MI
M	47	81	4.50	14	44	0	Non-fatal MI
M	72	141	2.40	6	6	6	Fatal MI
F	68	111	5.00	13	25	0	Non-fatal MI

Fabbri et al. submitted

Rapid rule-out of suspected ACS in the ED by high-sensitivity cardiac Troponin T levels at presentation .

Outcome measures	<5 ng/L (N = 326)	5 – 14 ng/L (N = 675)
1-year		
Fatal or Non-fatal MI		
No. of cases (% with 95% CI)	2 (0.6%; 0.1% - 2.0%) #	26 (3.9%; 2.6% - 5.5%)
NPV	**99.4% (97.7% - 99.8%)**	96.1% (95.7% - 96.5%)

Fabbri et al. submitted



Fabbri et al. submitted

Chest pain and Undetectable Troponin

1. Reliability confirmed in different prevalence of pts with chest pain and undetectable troponin, (32.6% in our study, from 6% in the ADAPT study to 60.8% in *Bandstein study].*
2. Prevalence may be dependent on clinical pathway: triage code variability and decision to initial blood sampling by a nurse or only after clinical evaluation.
3. Accuracy of "single-sample strategy" to rule out pts with chest pain remains uncertain if pts visited **<2 hrs from symtpoms onset**.

Undetectable concentrations of an FDA-approved high-sensitivity cardiac Troponin T assay to rule out AMI at emergency department arrival.

Results: A total of 7,130 retrospective pts. AMI incidences at 7, 30, and 90 days were 5.8, 6.0, and 6.2%. When the hsTnT assay was performed at ED arrival, the limit of blank of the assay (3 ng/L**) ruled out 7-day AMI in 15.5% of pts with 100% sensitivity** and negative predictive value (NPV).

The limit of detection **of the assay (**5 ng/L**) ruled out AMI in 33.6% of patients with 99.8% sensitivity and 99.95% NPV for 7-day AMI**.

The limit of quantification (the Food and Drug Administration [FDA]-approved cutoff for lower the reportable limit) of 6 ng/L **ruled out AMI in 42.2% of pts with 99.8% sensitivity and 99.95% NPV**. The sensitivities of the cutoffs of <3, <5, and <6 ng/L for 7-day MACE were 99.6, 97.4, and 96.6%, respectively. The NPVs of the cutoffs of <3, <5, and <6 ng/L for 7-day MACE were **99.8**, **99.5**, **99.4%**, respectively.

Mc Rae AS et al. ***Acad Emerg Med*** 2017

Conclusions:

Following the publication of the "**ANMCO-SIMEU Consensus Document: in-hospital management of patients presenting with chest pain**" ……. the single-sample strategy to rule out AMI can be used or not ????

In pts with chest pain, low-risk profile, ECG without any sign of ischemia, and undetectable Tn the risk thresold of 3-5 per 1000 for AMI at 30 day must be accepted or not????