Validation of the European Society of Cardiology 0/1-Hour Algorithm for Rule-out and Rule-in of Acute Myocardial Infarction

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Declaration of interest

- I have nothing to declare
Disclosures

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- University Hospital Basel

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Background

- 10% of all ED consultations suspected acute myocardial infarction (AMI)
- **AMI**: common & acute life-threatening condition

**Rapid diagnosis** and treatment is critical: “Time is muscle”

**Rapid rule-out** of major medical and economic importance:
- timely detection and treatment of alternative causes of acute chest pain
- consider discharge from ED / outpatient management in many of them

- The European Society of Cardiology (ESC) suggests the use of the **0/1-Hour Algorithm** for rapid rule-out and rule-in of Non-ST-Segment-Elevation Myocardial Infarction (NSTEMI)

- Its safety has been questioned

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Methods

- **Aim:** To validate the diagnostic performance of the ESC 0/1-Hour Algorithm

- **Population:**
  - pooled patient-level data from two prospective studies *(APACE and BACC)*
  - unselected patients presenting with symptoms suggestive of MI to the ED
  - 14 centers in **six European countries**
  - patients with STEMI excluded

- **Final diagnosis:** centrally adjudicated by two independent cardiologists.

- **Investigational biomarkers:** Hs-cTnT (Elecsys) and hs-cTnl (Architect) blood concentrations were measured at presentation and after one hour.
Results – ESC 0/1-Hour Algorithm

A

High-sensitivity cardiac troponin T (Elecsys®)

Suspected NSTEMI
n=4350

- 0h <12 ng/l
- 0h <5 ng/l
- Delta 1h <3 ng/l

RULE-OUT
(n=2473)

- Proportion: 57% (55-58)
- NPV: 99.8% (99.5-99.9)
- Sens: 99.3% (98.4-99.8)

OBSERVE
(n=1088)

- Proportion: 25% (24-26)
- NSTEMI: 14% (12-16)

RULE-IN
(n=789)

- Proportion: 18% (17-19)
- PPV: 74.7% (71.5-77.7)
- Spec: 94.5% (93.7-95.2)

Early presenters
n=1289

RULE-OUT
(n=764)

- Proportion: 59% (57-62)
- NPV: 99.6% (98.7-99.9)
- Sens: 98.2% (95.4-99.5)

OBSERVE
(n=290)

- Proportion: 22% (20-25)
- NSTEMI: 16% (12-20)

RULE-IN
(n=235)

- Proportion: 18% (16-20)
- PPV: 72.8% (66.6-78.4)
- Spec: 94.0% (92.4-95.4)
Results – ESC 0/1-Hour Algorithm

High-sensitivity cardiac troponin I (Architect®)

Suspected NSTEMI  
n=4350

- 0h <2 ng/l* OR
  - 0h <5 ng/l
    - Delta 1h <2 ng/l
- Other
  - 0h ≥52 ng/l OR Delta 1h ≥6 ng/l

RULE-OUT  
n=1990
Proportion: 46% (44-47)
NPV: 99.6% (99.1-99.8)
Sens: 98.8% (97.7-99.4)

OBSERVE  
n=1395
Proportion: 32% (31-34)
NSTEMI: 8% (7-10)

RULE-IN  
n=965
Proportion: 22% (21-23)
PPV: 64.2% (61.0-67.2)
Spec: 90.4% (89.4-91.4)

Early presenters  
n=1289

RULE-OUT  
n=631
Proportion: 49% (46-52)
NPV: 99.2% (98.2-99.7)
Sens: 97.7% (94.8-99.3)

OBSERVE  
n=393
Proportion: 30% (28-33)
NSTEMI: 9% (7-13)

RULE-IN  
n=265
Proportion: 21% (18-23)
PPV: 67.2% (61.2-72.8)
Spec: 91.9% (90.1-93.4)
Conclusions

I. The ESC 0/1-Hour Algorithms using high-sensitivity cardiac troponin T and I are very safe and effective in triaging patients with suspected NSTEMI.

II. Largest-ever subgroup analysis in early presenters confirmed very high safety.