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

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Disclosure information

- No conflicts of interest.

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Background

- Chest pain is one of the most common reasons for seeking medical attention in Emergency Departments (ED) with an estimated 15–20 million visits each year in Europe and the U.S.

- Only 10-20% of patients of patients hospitalized for chest pain are diagnosed with MI

- Unnecessary admissions are a burden for health care providers

Background

- The cornerstone of diagnosing MI is the ECG and biomarkers indicating myocardial damage, commonly cardiac troponins

- Recently high-sensitivity cardiac troponin assays have been introduced in clinical practice

- They are able to detect minimally increased levels of troponins in the blood several hours before older generations of troponin assays

- Repeated measurements of hs-cTnT may not be necessary

Hypothesis

- All patients with chest pain, who have an undetectable high-sensitivity cardiac troponin T (< 5 ng/l), and an ECG without signs of ischemia, may be discharged directly from the emergency department (ED), since their risk of MI within 30 days is minimal.

Setting and Study population

- All patients, > 25 years of age, who came to the emergency department at the Karolinska University Hospital in Stockholm, Sweden,

- with a principal complaint of chest pain, and at least one hs-cTnT level analyzed,

- during December 10, 2010 to December 31, 2012 were included

Methods

- High sensitivity cardiac troponin T (hs-cTnT)

- Elecsys 2010 system (Roche Diagnostics GmbH, Mannheim, Germany)

- Detection limit of 2 ng/l,

- 99th-percentile cutoff point of 14 ng/l

- Coefficient of variation was <10% at 13 ng/l

Methods

Exposure

- A first hs-cTnT < 5 ng/L (undetectable) in the ED, in combination with an ECG without significant ST-elevation or depression

- All ECGs for patients with undetectable hs-cTnT and MI were evaluated by two external senior cardiologists blinded for the study protocol

Methods

Outcome

- Primary outcome: Fatal or non-fatal MI within 30 days

- Secondary outomes:
  - MI at 180, and 365 days
  - all-cause mortality at 30, 180 and 365 days
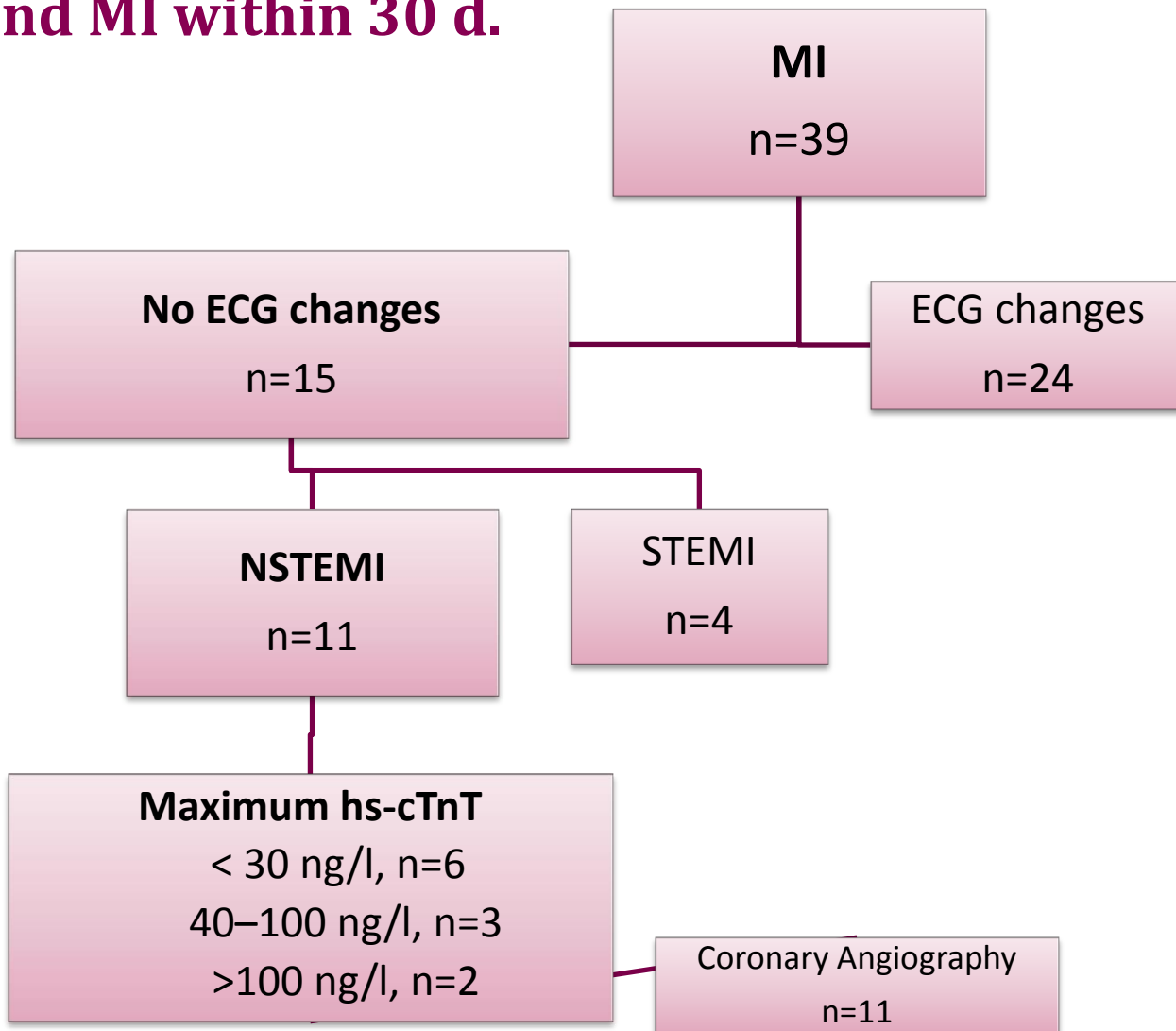
Study population
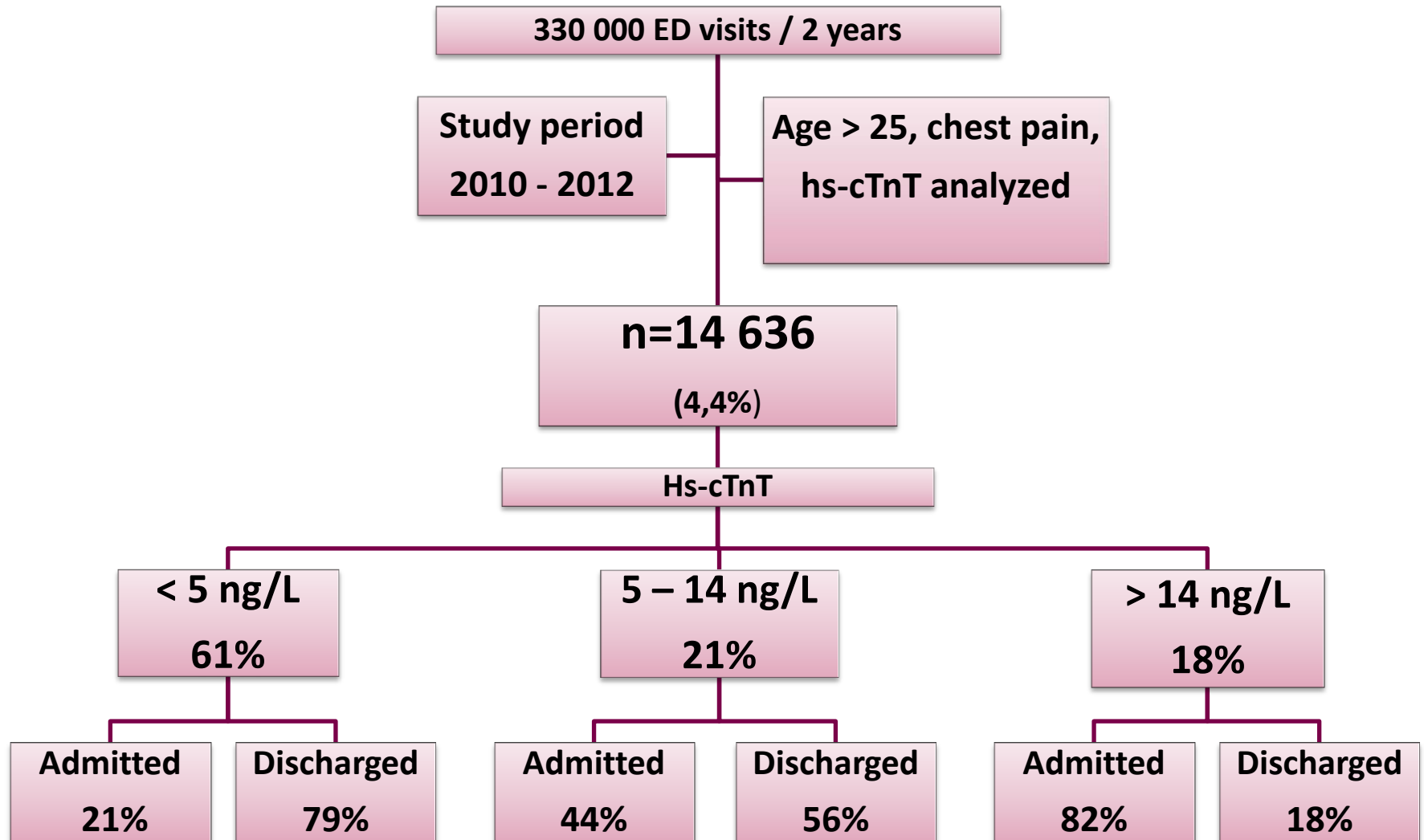
Results
patient characteristics

	All patients	High-sensitivity Cardiac Troponin T level (ng/L)		
		<5	5-14	>14
Number of patients	14 636	**8 907**	3 150	2 579
Percent of cohort	100	**61**	22	18
Age (y)	55	**47**	63	71
Female sex, (%)	48	**53**	41	37
Diabetes (%)	10	**5**	14	21
Prior MI (%)	9	**4**	14	39
Prior Stroke (%)	5	**2**	7	13
Prior CHF (%)	6	**1**	8	22

Patients with undetectable hs-cTnT and MI within 30 d.

Timing of hs-cTnT level analysis in MI patients with undetectable hs-cTnT and ECG without ischemia

- The first hs-cTnT level was measured within 2 h of the onset of symptoms in 11 (73%) patients,

- between 2 to 3 hours in 2 (13%) patients, and

- >3 h after the onset of symptoms in 2 (13%) patients.

Risk of Myocardial Infarction

	High-Sensitivity Cardiac Troponin T level (ng/L)		
	<5	**5-14**	**>14**
Myocardial infarction			
30 days			
Number of events	**15**	97	676
Negative pred. val.	**99,8 (99,7-99,9)**	96,9 (96,3-97,5)	73,8 (72,1-75,5)
365 days			
Number of events	54	134	753
Negative pred. val.	99,4 (99,2-99,5)	95,7 (95,0-96,5)	70,8 (69,0-72,6)

Risk of death in patients with undetectable hs-cTnT

- There were 2 deaths within 30 days

- The NPV for death was 100% (99.9-100)

- At 1 year of follow-up there were 38 deaths, of whom 32 were caused by cancer and 2 were cardiovascular

Discharge diagnosis in patients with undetectable hs-cTnT who were admitted

- 77% of admitted patients were discharge the same or the next day,

- In patients with undetectable hs-cTnT 50% had a discharge diagnosis of unspecific chest pain,

- the second most common diagnosis was atrial fibrillation (6%),

- the third most common diagnosis was angina pectoris (5%)

Clinical Implications

- Unnecessary admissions may be avoided

- May help diminish overcrowding of the ED

- Saving time for the patient and the doctor

Conclusion

- A first hs-cTnT level of <5 ng/l and no signs of ischemia on ECG ruled out MI with nearly 100% accuracy regardless of prior disease, timing of measurement of the hs-cTnT level, age, sex, or other risk factors for MI,

- The negative predictive value for death associated with an undetectable hs-cTnT and an ECG without signs of ischemia was 100%,

- Only in our hospital this simple strategy may prevent 500 to 1000 unnecessary hospitalizations per year

Thank you ACC.14