ACSIS 2021

Acute Coronary Syndrome Israeli Survey
March-April 2021

SURVEY FINDINGS
AND
TEMPORAL TRENDS

2010 - 2021

The Working Group on
Intensive Cardiac Care
of the Israel Heart Society

The Israel
Heart Society

The Israeli Center for
Cardiovascular
Research

The Israeli Center for
Disease Control, the
Ministry of Health

ICCR

Booklet ACSIS 2021
September 2022

Contents

Introduction

We are proud to present you with the ACSIS 2021 survey results. This survey, is a biennial tradition since it was launched in 1992 by Prof. Shlomo Behar.

The ACSIS survey provides a state-of-the-art representation of the characteristics, management, and outcome of patients presenting with an acute coronary syndrome (ACS) in Israel. This survey is a source of pride for the Israeli cardiology community.

ACSIS 2021 was carried out during March-April 2021 by the Israeli working group on Acute Cardiac Care of the Israel Heart Society, and the Israeli Center for Cardiovascular Research (ICCR) in cooperation with the Israeli Center for Disease Control (ICDC) and Israel Society of Intensive Care Nursing.

During this 2-month period, detailed data was collected in all intensive cardiac care units (ICCU) and cardiology wards in all public hospitals in Israel, and included 1750 consecutive ACS patients admitted and diagnosed with ACS.

The ACSIS 2021 findings expand on prior surveys by showing a continuous improvement in in-hospital, 1 month, as well as 1-year mortality throughout the last decade.

ACSIS data is used continuously for high-quality scientific research which is published in the major journals in the field.

We thank the Israeli Center for Disease Control (ICDC) as well as the pharmaceutical industry in their continuing unconditional support of this important survey.

Finally, we would like to thank and recommend the dedication of all the study coordinators and staff members of all CCU's and Cardiology wards for their dedicated time and effort in collecting the data.

Prof. Roy Beigel	Dr. Katia Orvin
Chairman	Secretary

Israeli working-group on Acute Cardiac Care

Message from the Israel Heart Society

The Israel Heart Society is proud to present the final results of the ACSIS 2021 survey.

ACSIS is a biannual survey conducted over a 2 months period in all coronary care units operating in Israel and includes all ACS patients admitted during the survey period. The survey has been conducted since 2000. Over this long period it has provided invaluable insights into the characteristics, management and outcome of our patients. The survey allows benchmarking for individual centers, has produced numerous scientific papers and allows important analyses of long term trends in ACS.
The 2021 ACSIS survey follows in the footsteps of previous surveys and extends the observations yet more. The data presented here are of great interest to anyone interested in the epidemiology and management of ACS in Israel and globally. We would like to thank the ACSIS steering committee, led by the ACC WG for their very thorough work in organizing this survey and preparing the data for presentation and for our many industry partners who supported this great effort.

We trust you will find these data important and interesting.

Prof. Ofer Amir	Dr. Arik Wolak
President	Secretary General

The Israel Heart Society

The ACSIS 2021 survey was generously supported by an unrestricted grant by the following companies:

Chapter 1: Acute Coronary Syndrome in Cardiology

1.1 Distribution of Patients with ACS by ECG on Admission

Figure 1.1.a: Distribution of Patients with ACS by ECG on Admission
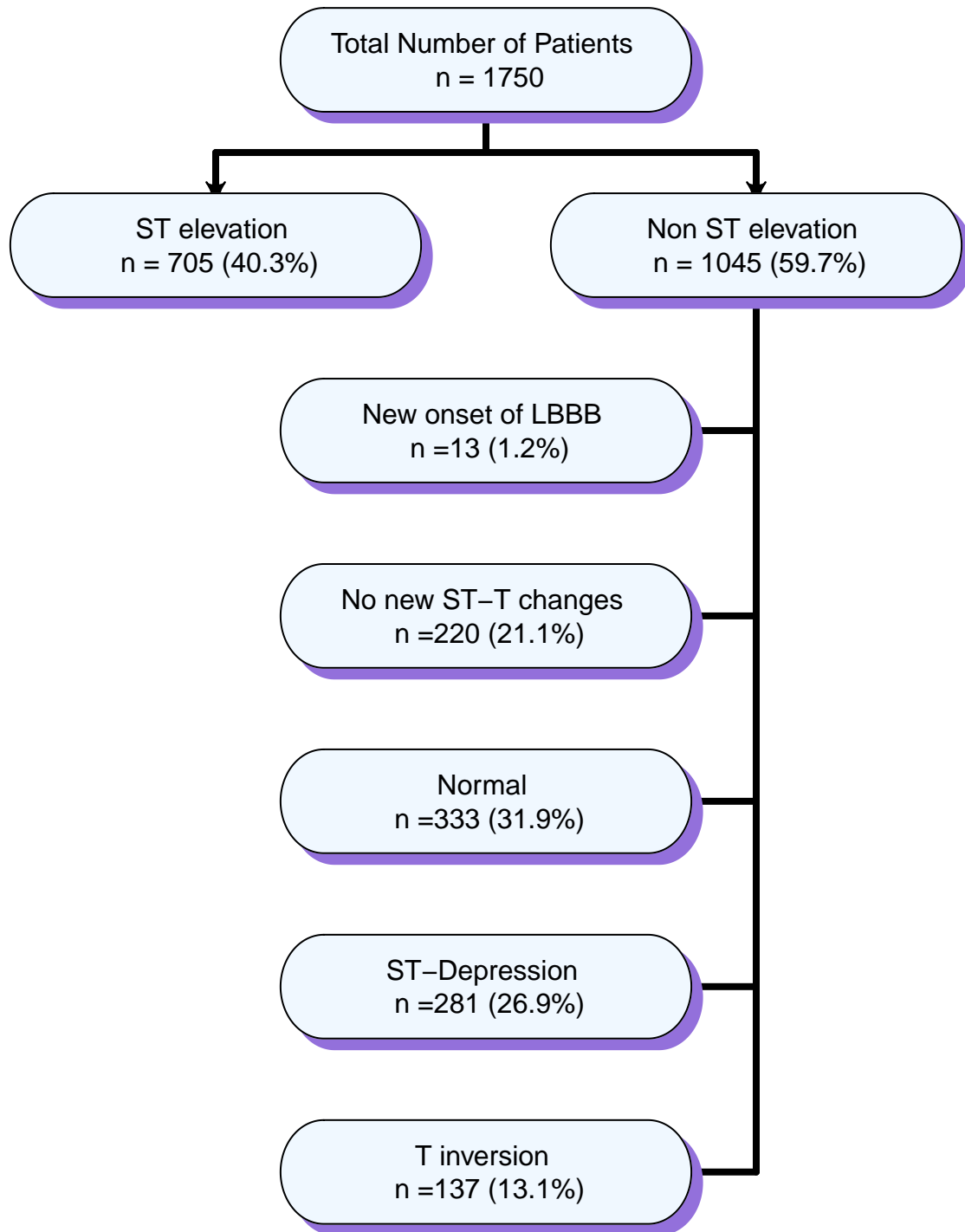
Figure 1.1.b: Distribution of Patients with ACS by Discharge Diagnosis
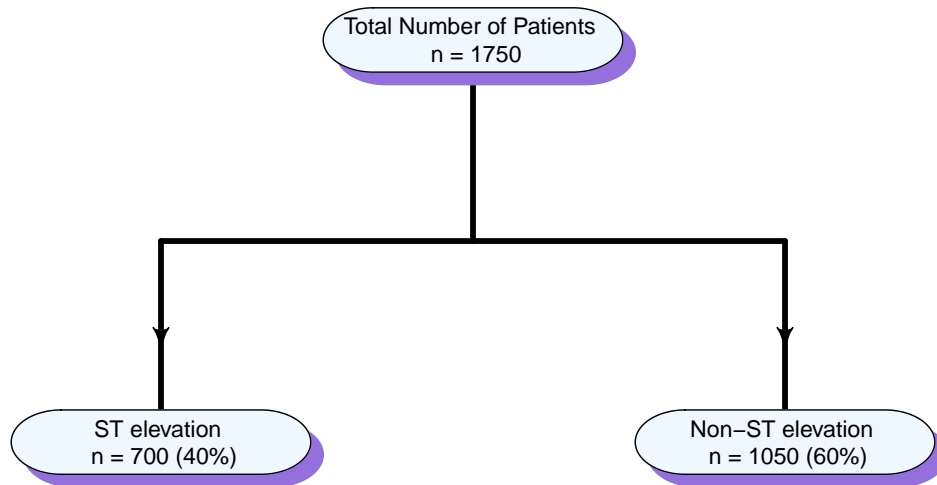
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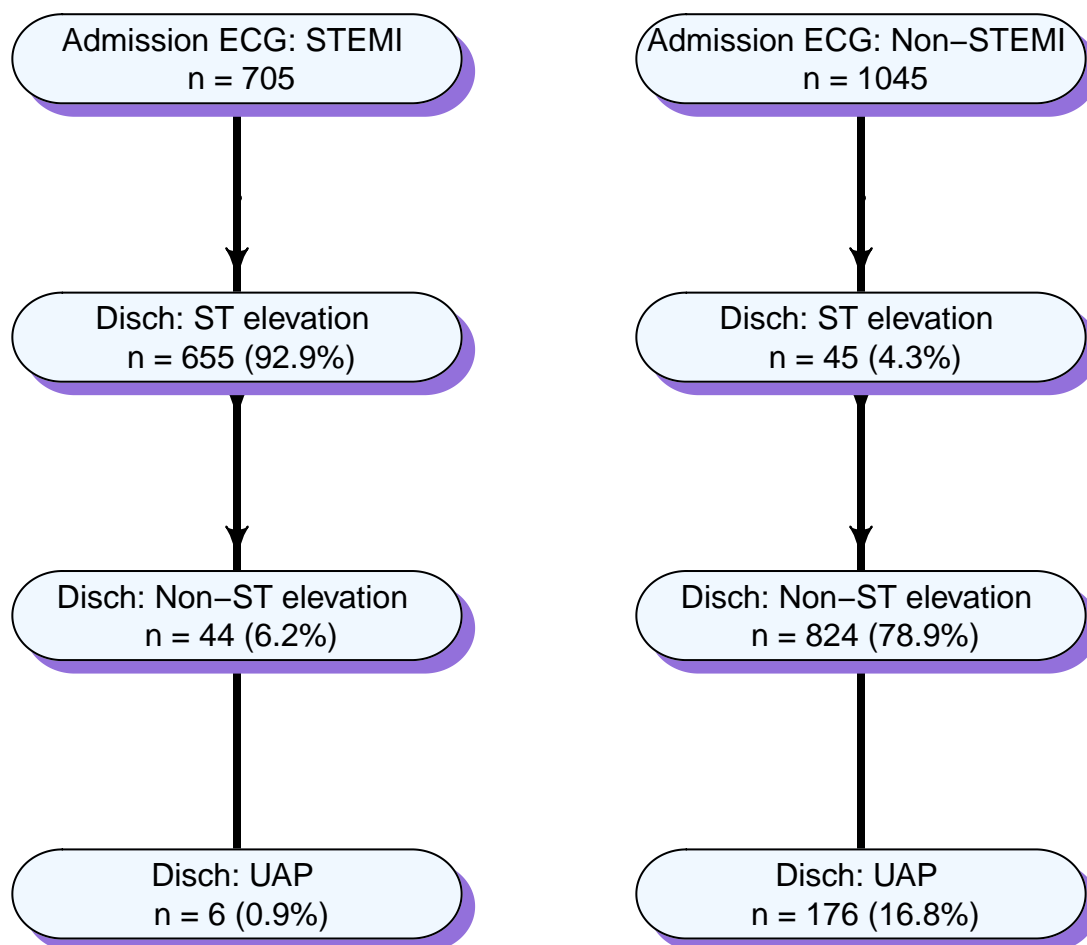
1.2 Demographic Characteristics

1.2.1 Age Distribution by ECG on Admission

Patients with ST elevation were younger (mean age: 61.8 ± 12.6) than those with non-ST elevation (mean age: 65.8 ± 11.9), and the age distribution of patients with ST elevation indicated a greater proportion of younger patients (59.1% were aged < 65 years) than that of patients with non-ST elevation (45.5% aged < 65 years).

Table 1.1: Age Distribution by ECG on Admission

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
Age groups (%)				<0.001
< 50	214 (12.2)	94 (9.0)	120 (17.1)	
50-64	678 (38.7)	384 (36.6)	294 (42.0)	
65-79	651 (37.2)	430 (41.0)	221 (31.6)	
≥ 80	207 (11.8)	142 (13.5)	65 (9.3)	
Age (mean(sd))	64.20 (12.31)	65.83 (11.86)	61.77 (12.59)	<0.001

Percentages are calculated out of available data

Figure 1.2: Age Distribution by ECG on Admission
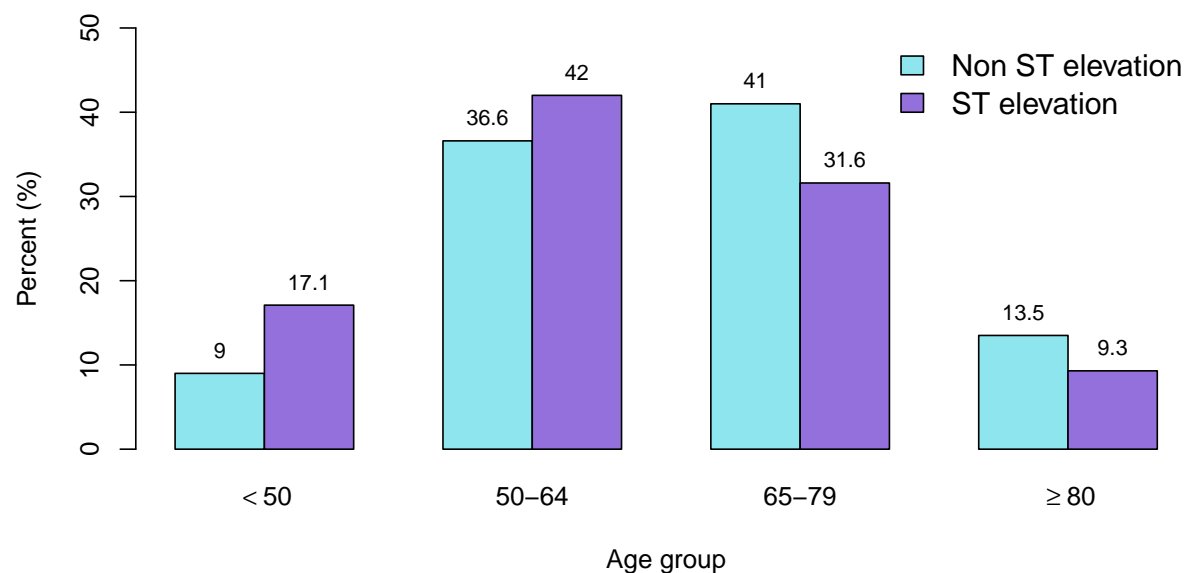
1.2.2 Age Distribution by Gender

The age distribution of male patients was significantly different from that of female patients. The majority of men (55.6%) were in the younger age groups (< 65) and only 9% were aged 80 or above. 13.5% of men were less than 50 years old. By contrast, the majority of the female patients were in the older age groups ≥ 65 (67.1%). The number of women under the age of 50 was significantly less than of their male counterparts (7.2%), and 22.8% were aged 80 or above.

Table 1.2: Age Distribution by Gender

	Total	Women	Men	p-value
n	1750	359	1391	
Age groups (%)				<0.001
< 50	214 (12.2)	26 (7.2)	188 (13.5)	
50-64	678 (38.7)	92 (25.6)	586 (42.1)	
65-79	651 (37.2)	159 (44.3)	492 (35.4)	
≥ 80	207 (11.8)	82 (22.8)	125 (9.0)	
Age (mean(sd))	64.20 (12.31)	69.42 (12.44)	62.86 (11.92)	<0.001

Percentages are calculated out of available data

Figure 1.3: Age Distribution by Gender
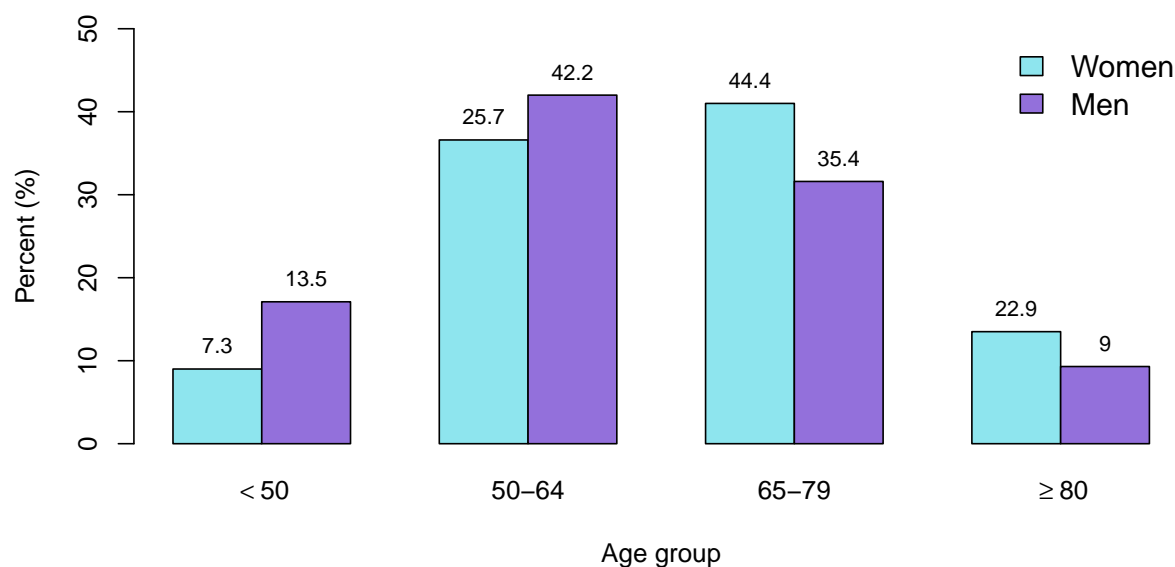
1.2.3 Gender Distribution

For both ST and non-ST segment elevation ACS we observed similar male predominance.

Table 1.3: Gender Distribution

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
Women (%)	359 (20.5)	227 (21.6)	132 (18.9)	0.180
Men (%)	1391 (79.5)	823 (78.4)	568 (81.1)	

Percentages are calculated out of available data

Figure 1.4: Gender Distribution

Patients with ST Elevation

Women 19 %

Men 81 %

Patients with Non–ST Elevation

Women 22 %

Men 78 %
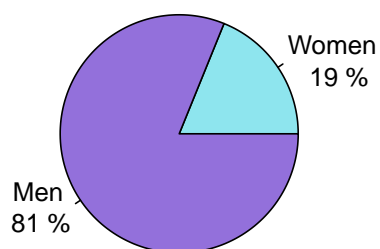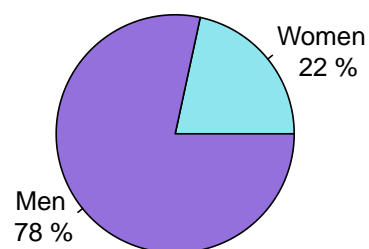
1.3 Cardiovascular History

1.3.1 Cardiovascular History

A history of ACS, cardiomyopathy, heart failure (CHF), chronic renal failure, PAD and atrial fibrillation was significantly more frequent among patients with non-ST elevation ACS. Similarly, more patients with non-ST elevation MI had undergone percutaneous interventions (PCI) or coronary artery bypass grafting (CABG) prior to hospitalization.

Table 1.4: Prior Cardiovascular History

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
ACS (%)	651 (37.3)	479 (45.7)	172 (24.7)	<0.001
CABG (%)	128 (7.3)	110 (10.5)	18 (2.6)	<0.001
PCI (%)	611 (34.9)	449 (42.8)	162 (23.2)	<0.001
Cardiomyopathy (%)	92 (5.3)	74 (7.1)	18 (2.6)	<0.001
CHF (%)	124 (7.1)	102 (9.7)	22 (3.1)	<0.001
Chronic renal failure (%)	184 (10.5)	147 (14.0)	37 (5.3)	<0.001
PAD (%)	128 (7.3)	94 (9.0)	34 (4.9)	0.002
Stroke/TIA (%)	154 (8.8)	115 (11.0)	39 (5.6)	<0.001
COPD (%)	107 (6.1)	81 (7.7)	26 (3.7)	0.001
Atrial fibrillation/Flutter (%)	106 (6.1)	81 (7.7)	25 (3.6)	0.001
AICD/CRT implant (%)	21 (1.2)	18 (1.7)	3 (0.4)	0.027
Any malignancy (%)	117 (6.8)	83 (8.0)	34 (4.9)	0.015
Thyroid disease (%)	78 (4.6)	54 (5.2)	24 (3.5)	0.116

Percentages are calculated out of available data

Figure 1.5: Cardiovascular history
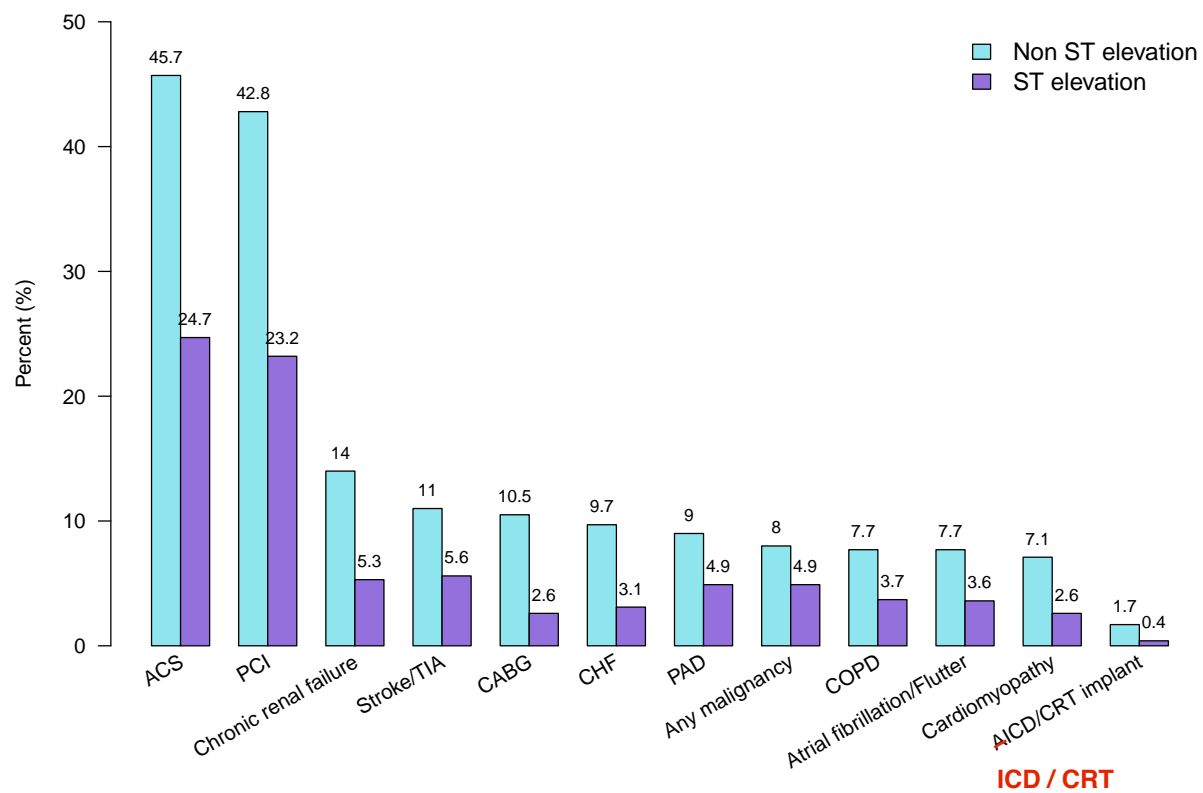
1.3.2 Risk Factors

Current smoking was more prevalent among patients presenting with ST-elevation ACS, while other risk factors were generally more prevalent among patients presenting with non-ST elevation ACS. The rates of newly diagnosed diabetes were higher among those with ST-elevation. No difference was found in the prevalence of family history of coronary artery disease (CAD).

Table 1.5: Risk Factors

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
Hypertension (%)	1107 (63.4)	764 (73.0)	343 (49.0)	<0.001
Diabetes (%)	741 (42.4)	494 (47.1)	247 (35.3)	<0.001
* Newly diagnosed (%)	43 (5.8)	17 (3.4)	26 (10.5)	<0.001
Dyslipidemia (%)	1228 (70.4)	804 (76.9)	424 (60.7)	<0.001
Current smoker (%)	723 (41.3)	379 (36.1)	344 (49.1)	<0.001
Past smoker (%)	330 (18.9)	229 (21.8)	101 (14.4)	<0.001
Family history of CAD (%)	436 (28.9)	270 (30.2)	166 (27.0)	0.198

Percentages are calculated out of available data

Newly diagnosed expressed as percentage of total patients with specific risk factor

Figure 1.6: Risk Factors
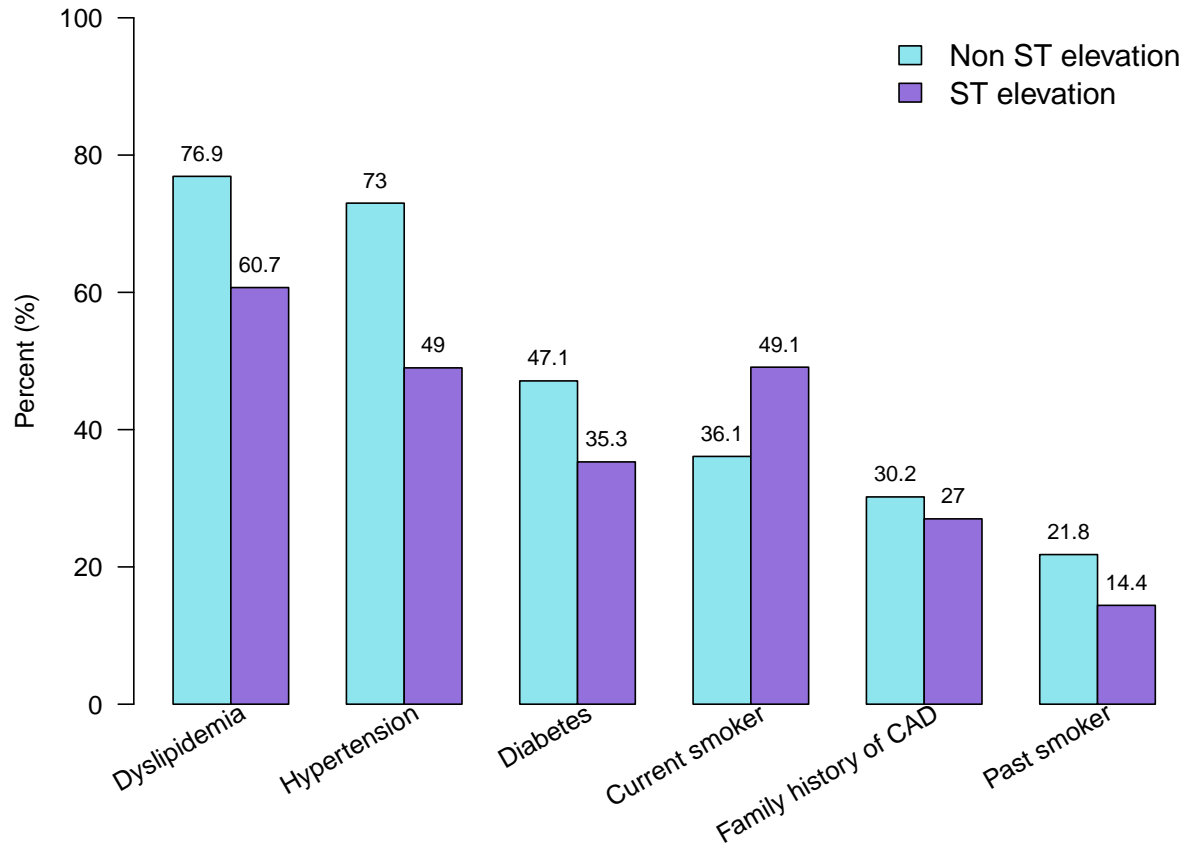
1.4 Prior Chronic Treatment

Prior to the index hospitalization, a higher proportion of patients with a non-ST elevation ACS (48.4%) were being treated with aspirin compared to those with ST elevation (25.6%). Other drugs in common use were ACE Inhibitors and ARB's, Beta Blockers, lipid-lowering drugs (primarily statins) and diuretics all of which were in use more frequently among patients presenting with non-ST elevation ACS. 12.9% of patients with non-ST elevation and 2.9% of those with ST elevation were being treated with clopidogrel.

Table 1.6: Prior Chronic Treatment

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
Anti-platelets				
Aspirin (%)	687 (39.3)	508 (48.4)	179 (25.6)	<0.001
P2Y12 (%)	210 (12.0)	177 (16.9)	33 (4.7)	<0.001
Clopidogrel (%)	155 (8.9)	135 (12.9)	20 (2.9)	<0.001
Prasugrel (%)	26 (1.5)	18 (1.7)	8 (1.1)	0.443
Ticagrelor (%)	29 (1.7)	24 (2.3)	5 (0.7)	0.020
Anticoagulants				
Oral anticoagulants[1](%)	108 (6.2)	85 (8.1)	23 (3.3)	<0.001
NOAC (%)	94 (5.4)	73 (7.0)	21 (3.0)	<0.001
Warfarin (%)	14 (0.8)	12 (1.1)	2 (0.3)	0.090
Dabigatran (%)	9 (0.5)	5 (0.5)	4 (0.6)	1.000
Rivaroxaban (%)	21 (1.2)	17 (1.6)	4 (0.6)	0.081
Apixaban (%)	64 (3.7)	51 (4.9)	13 (1.9)	0.002
Other				
ACE-I (%)	356 (20.3)	252 (24.0)	104 (14.9)	<0.001
ARB (%)	271 (15.5)	198 (18.9)	73 (10.4)	<0.001
ACE-I/ARB (%)	622 (35.5)	445 (42.4)	177 (25.3)	<0.001
Beta Blockers (%)	501 (28.6)	364 (34.7)	137 (19.6)	<0.001
CCB (%)	291 (16.6)	218 (20.8)	73 (10.4)	<0.001
Nitrates (%)	19 (1.1)	19 (1.8)	0 (0.0)	0.001
Diuretics (%)	116 (6.6)	92 (8.8)	24 (3.4)	<0.001
Antihyperglycemic drugs[2] (%)	398 (22.7)	277 (26.4)	121 (17.3)	<0.001
Statins[3] (%)	719 (41.1)	513 (48.9)	206 (29.4)	<0.001
Ezetimibe (%)	134 (7.7)	105 (10.0)	29 (4.1)	<0.001

[1] Oral anticoagulants include: Warfarin, Dabigatran, Rivaroxaban, Apixaban

[2] Antihyperglycemic drugs include: Glibenclamide, Glipizide, Glimepiride, Metformin, Sitagliptine, Saxagliptine, Vidagliptine, Linagliptine, Exenatide, Liraglutide, Dapagliflozine, Acarbose, Meglinitides, TZDs, Rosiglitazone

[3] Statins include: Simvastatin, Pravastatin, Atorvastatin, Rosuvastatin

[*] Percentages are calculated out of available data

Figure 1.7: Prior Chronic Treatment
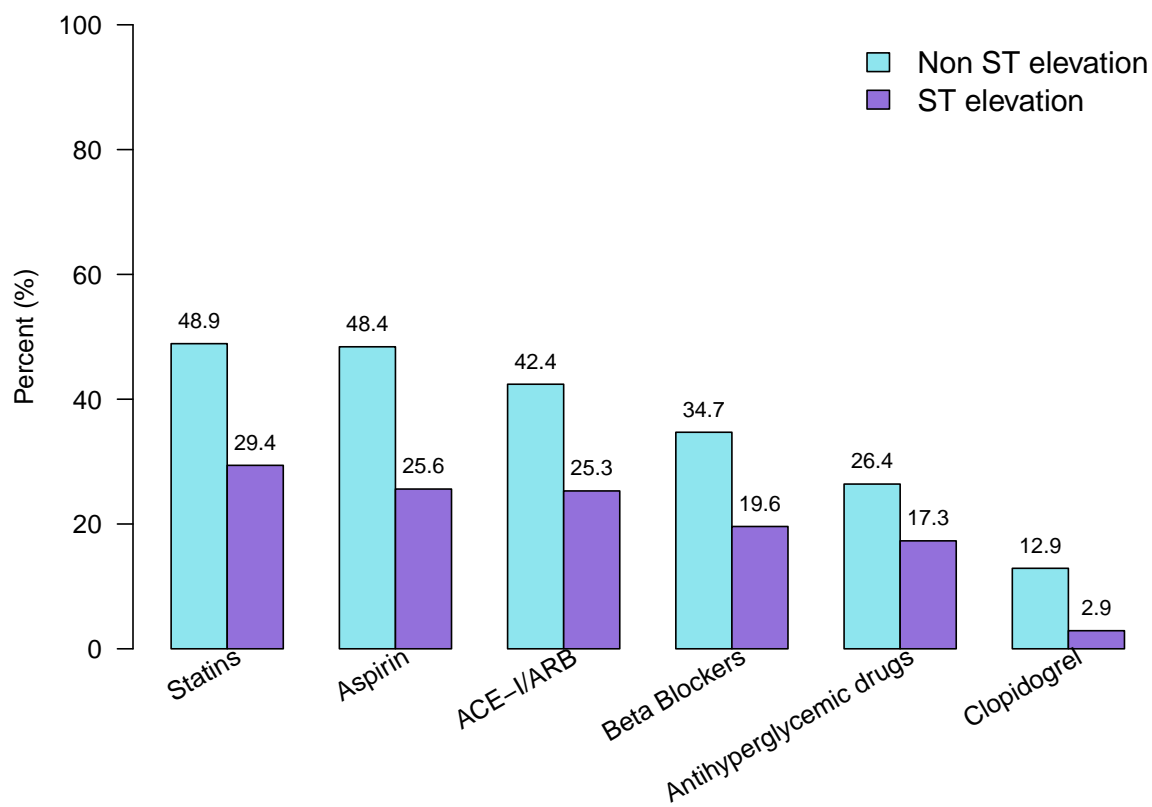
1.5 Transportation, Pre-Admission and Admission Information

1.5.1 Mode of Transportation by ECG on Admission

43.7% of all patients arrived at the hospital by means of private transportation. Patients with ST elevation were more frequently transported to hospital with mobile intensive care unit (MICU), and patients with non-ST elevation arrived more frequently by means of private transportation.

Table 1.7: Mode of Transportation by ECG on Admission

	Total	Non ST elevation	ST elevation
n[1]	1614	945	669
MICU (%)	718 (44.5)	279 (29.5)	439 (65.6)
Private car/ independently (%)	705 (43.7)	534 (56.5)	171 (25.6)
Regular ambulance (%)	191 (11.8)	132 (14.0)	59 (8.8)

p-value <0.001

[1] Excluded in-patients

Figure 1.8: Mode of Transportation by ECG on Admission
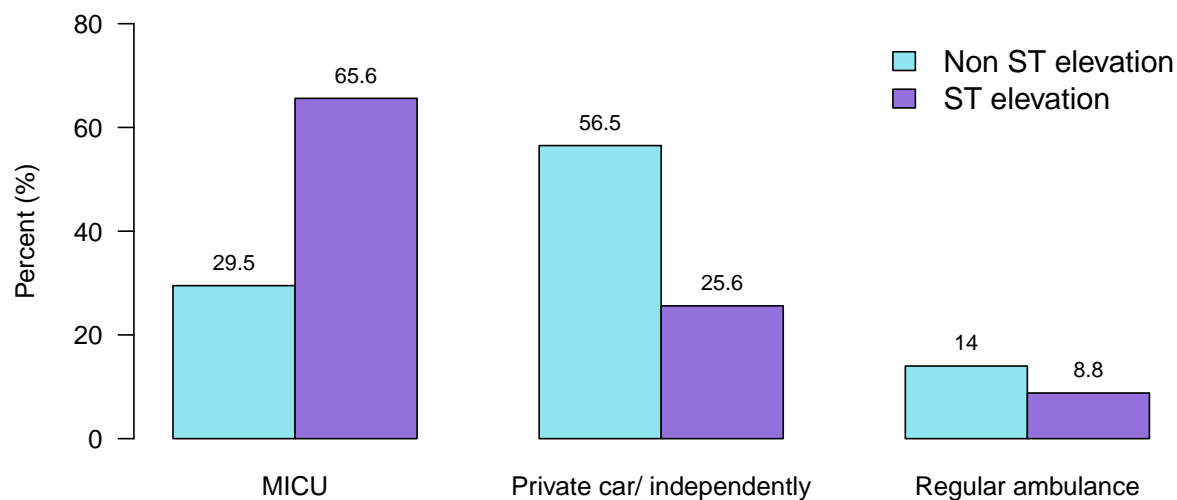
1.5.2 Mode of Transportation by Gender

44.5% of patients, both men and women, arrived by means of a MICU. Women were more frequently transported to hospital with regular ambulance and men arrived more frequently by means of private transportation.

Table 1.8: Mode of Transportation by Gender

	Total	Women	Men
n[1]	1614	332	1282
MICU (%)	718 (44.5)	147 (44.3)	571 (44.5)
Private car/ independently (%)	705 (43.7)	130 (39.2)	575 (44.9)
Regular ambulance (%)	191 (11.8)	55 (16.6)	136 (10.6)

p-value = 0.007
[1] Excluded in-patients

Figure 1.9: Mode of Transportation by gender
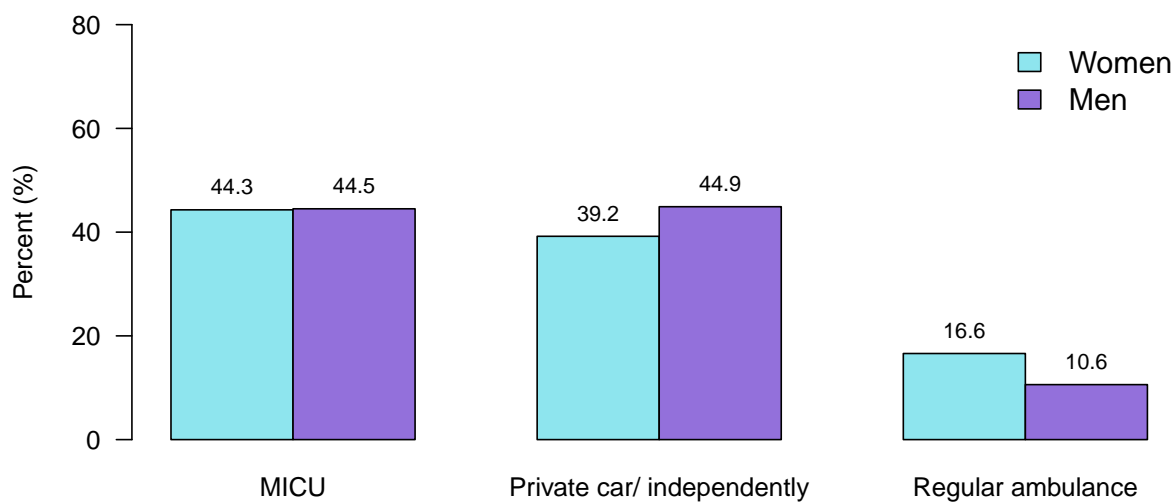
1.5.3 Drugs administered at the Emergency Department (ED)

Table 1.9: Drugs administered at the Emergency Department (ED)

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
Aspirin (%)	683 (52.3)	465 (48.1)	218 (63.9)	<0.001
Clopidogrel (%)	176 (13.5)	142 (14.7)	34 (10.0)	0.035
Prasugrel (%)	80 (6.1)	13 (1.3)	67 (19.6)	<0.001
Ticagrelor (%)	127 (9.7)	64 (6.6)	63 (18.5)	<0.001
Heparin (%)	353 (27.0)	171 (17.7)	182 (53.4)	<0.001
LMWH (%)	127 (9.7)	108 (11.2)	19 (5.6)	0.004

Figure 1.10: Drugs administered at the Emergency Department (ED)
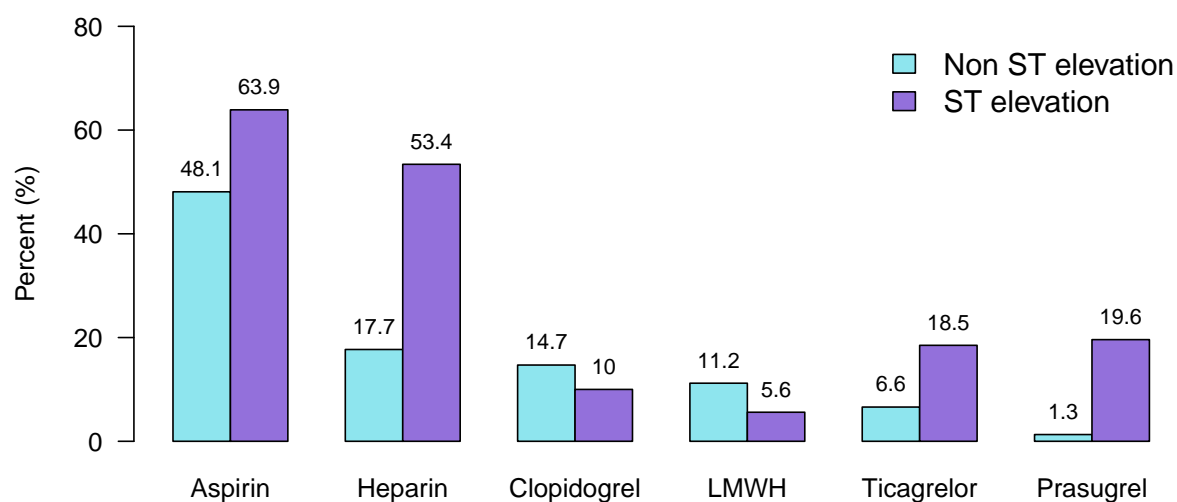
1.5.4 Ward of First Arrival by ECG on Admission

Most patients with ACS present to the Emergency Department (ED). However, a higher number of patients with an ST elevation ACS present directly to the cardiac care unit (CCU) and the catheterization laboratory than those with non-ST elevation ACS.

Table 1.10: Ward of First Arrival by ECG on Admission

	Total	Non ST elevation	ST elevation
n	1750	1050	700
Directly to cath lab (%)	212 (12.1)	24 (2.3)	188 (26.9)
Directly to CCU (%)	204 (11.7)	37 (3.5)	167 (23.9)
ED (%)	1307 (74.7)	966 (92.1)	341 (48.7)
Other (%)	26 (1.5)	22 (2.1)	4 (0.6)
Patients arrived by MICU			
n	718	279	439
Directly to cath lab (%)	188 (26.2)	13 (4.7)	175 (39.9)
Directly to CCU (%)	175 (24.4)	24 (8.6)	151 (34.4)
ED (%)	352 (49.0)	240 (86.0)	112 (25.5)
Other (%)	3 (0.4)	2 (0.7)	1 (0.2)

Difference in ward of first arrival, ST elevation vs. non-ST elevation, p <0.001

1.5.5 First Ward of Hospitalization

As expected, the majority of patients presenting with ST elevation were hospitalized in the cardiac care unit (CCU) (95.6%). 48.9% of the patients who presented with non-ST elevation were admitted to the CCU and an additional 32.4% to a cardiology department, with the remaining 17% being admitted to internal medicine departments.

Table 1.11: First Ward of Hospitalization

	Total	Non ST elevation	ST elevation
n	1750	1050	700
CCU (%)	1182 (67.5)	513 (48.9)	669 (95.6)
Cardiology (%)	356 (20.3)	340 (32.4)	16 (2.3)
Internal medicine (%)	184 (10.5)	179 (17.0)	5 (0.7)
Chest pain unit (%)	7 (0.4)	5 (0.5)	2 (0.3)
Other (%)	21 (1.2)	13 (1.2)	8 (1.1)

Difference in first ward of hospitalization, ST elevation vs. non-ST elevation, p <0.001

Figure 1.11: First Ward of Hospitalization
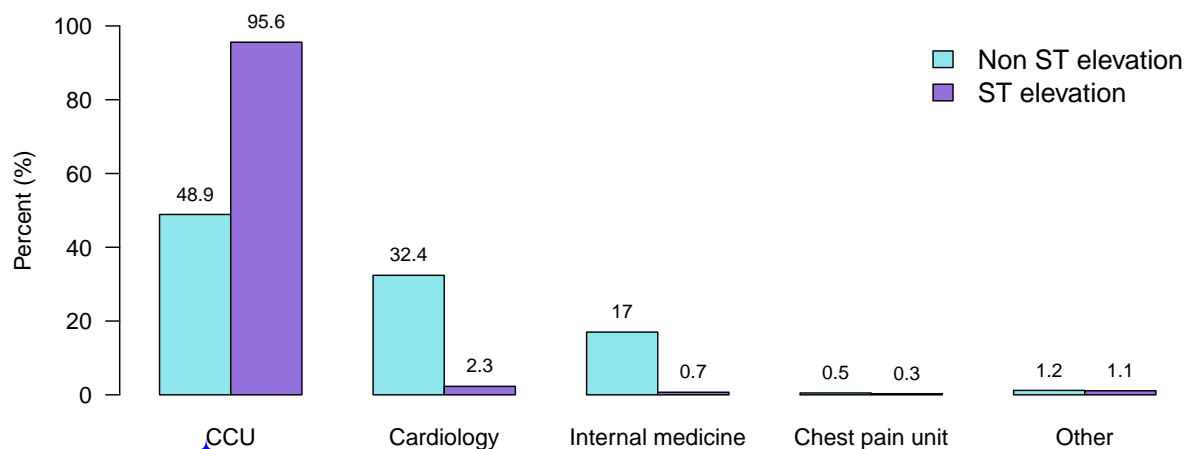
1.5.6 Time from Symptom Onset to Hospital Arrival, by ECG on Admission

All time frames were significantly shorter for patients with ST elevation. Patients with ST elevation sought help earlier when compared to patients with non-ST elevation.

Table 1.12: Time (minutes) from Symptom Onset to Admission, by ECG on Admission

	Total	Non ST elevation	ST elevation	p-value
n[1]	1059	535	524	
Onset to first medical contact (median [IQR])	90.00 [31.00, 498.00]	172.50 [50.00, 1229.00]	65.00 [30.00, 205.50]	<0.001
First medical contact to arrival (median [IQR])	51.00 [34.00, 80.00]	60.00 [38.00, 106.50]	48.00 [31.00, 65.00]	<0.001
Onset to arrival (median [IQR])	154.00 [82.00, 602.00]	240.00 [102.25, 1449.25]	117.00 [74.00, 270.00]	<0.001

[1] Excluded in-patients or patients whose first medical contact was in ER

Figure 1.12: Median Length of Time from Symptom Onset to Admission (minutes)
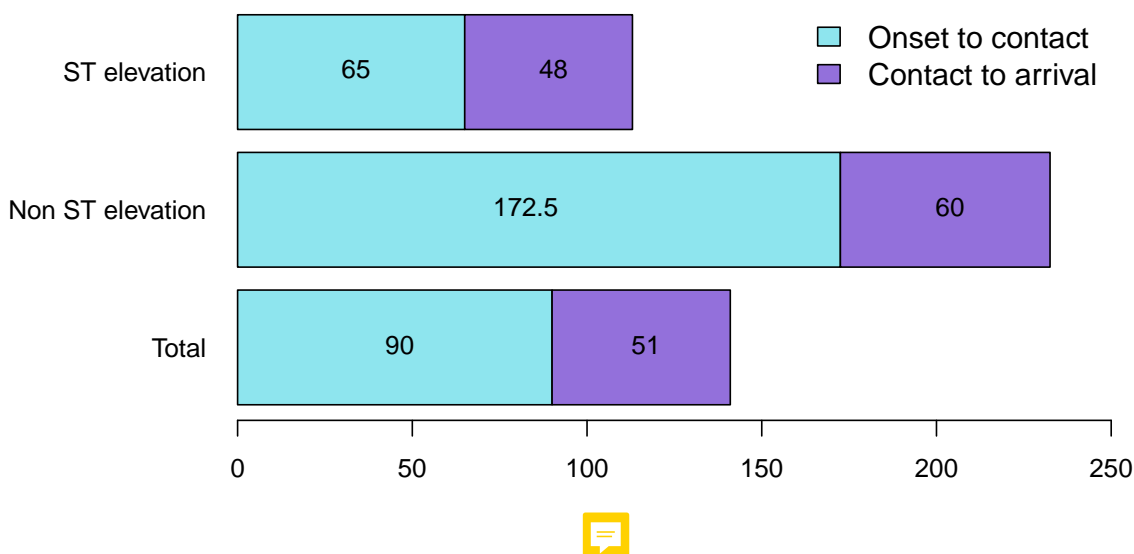
1.5.7 Time from Symptom Onset to Hospital Arrival, by gender

Table 1.13: Time (minutes) from Symptom Onset to Admission by gender

	Total	Women	Men	p-value
n[1]	1059	223	836	
Onset to first medical contact (median [IQR])	90.00 [31.00, 498.00]	115.00 [40.25, 397.50]	89.00 [30.00, 561.00]	0.728
First medical contact to arrival (median [IQR])	51.00 [34.00, 80.00]	51.00 [35.00, 75.00]	51.00 [33.00, 80.25]	0.946
Onset to arrival (median [IQR])	154.00 [82.00, 602.00]	168.00 [88.50, 539.75]	151.00 [80.00, 619.00]	0.621

[1] Excluded in-patients or patients whose first medical contact was in ER

Figure 1.13: Median Length of Time from Symptom Onset to Admission (minutes)
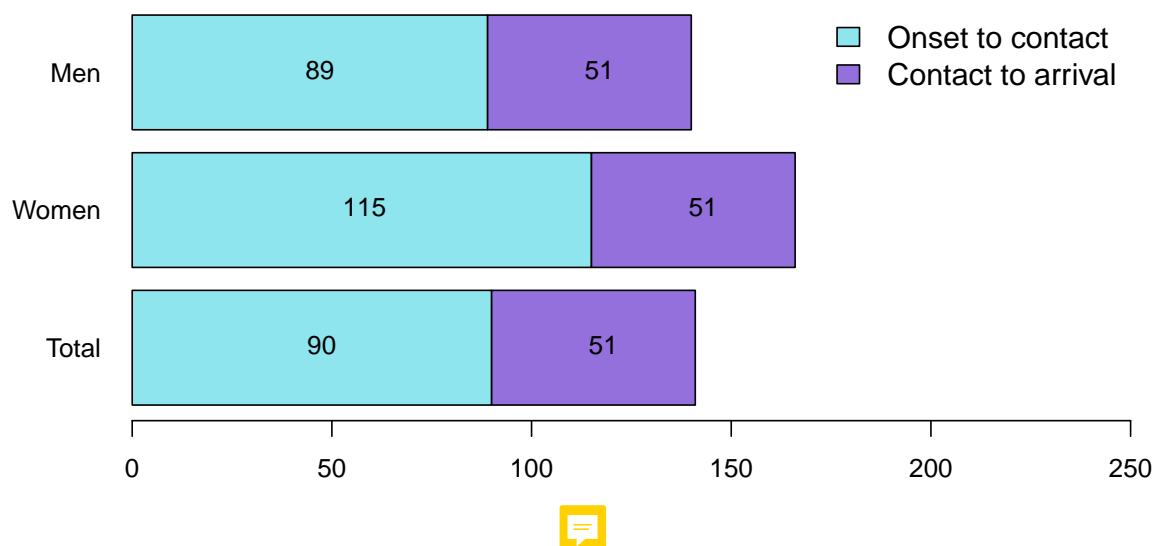
1.5.8 First Medical Contact

37.4% of patients had the first medical contact at the emergency room (ER) and about 25.6% at a primary clinic/"Moked". For an additional 23.5% the primary medical contact was with a mobile intensive care unit (MICU). Patients with ST elevation were more likely to have their first medical contact with a MICU (37.6%) than those with non-ST elevation (14.1%).

Table 1.14: First Medical Contact

	Total	Non ST elevation	ST elevation
n	1750	1050	700
ED (%)	654 (37.4)	484 (46.1)	170 (24.3)
HMO Out Pts. clinic / 'Moked' (%)	448 (25.6)	277 (26.4)	171 (24.4)
Home visit (%)	37 (2.1)	16 (1.5)	21 (3.0)
In-patient (%)	37 (2.1)	31 (3.0)	6 (0.9)
MICU (%)	411 (23.5)	148 (14.1)	263 (37.6)
Other hospital (%)	33 (1.9)	24 (2.3)	9 (1.3)
Regular ambulance (%)	130 (7.4)	70 (6.7)	60 (8.6)

Difference in location of first medical contact, ST elevation vs. non-ST elevation, p <0.001

Figure 1.14: First Medical Contact
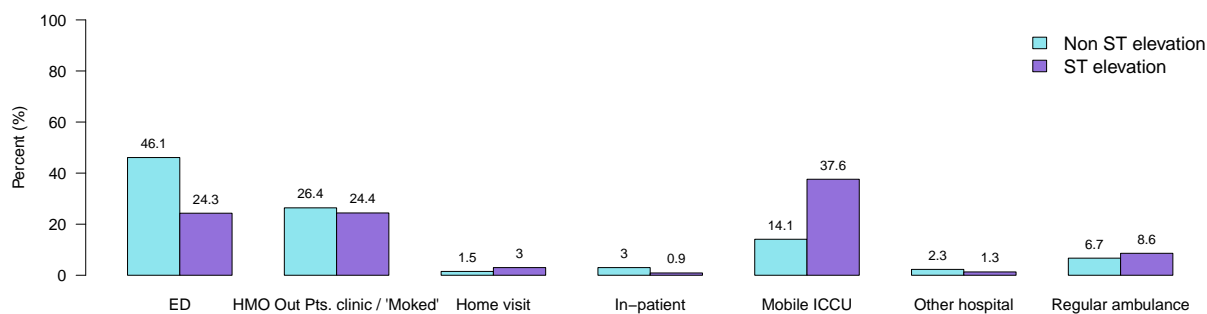
1.5.9 Presenting Symptoms and Killip Class

Typical angina was significantly more frequent in patients presenting with ST elevation (81.6%) than those presenting with non-ST elevation (71.1%). However, atypical chest pain was more common in patients presenting with non-ST elevation (16.5%) than in those with ST elevation (12.7%). Also dyspnea was more common in patients with non-ST elevation (23.9%) than those with ST elevation (12.3%).

Table 1.15: Presenting Symptoms at First Medical Contact

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
Typical angina (%)	1318 (75.3)	747 (71.1)	571 (81.6)	<0.001
Atypical chest pain (%)	262 (15.0)	173 (16.5)	89 (12.7)	0.036
Syncope (%)	56 (3.2)	24 (2.3)	32 (4.6)	0.012
Aborted SCD (%)	22 (1.3)	6 (0.6)	16 (2.3)	0.003
Palpitations (%)	27 (1.5)	24 (2.3)	3 (0.4)	0.004
Dyspnea (%)	337 (19.3)	251 (23.9)	86 (12.3)	<0.001
Abdominal pain (%)	78 (4.5)	40 (3.8)	38 (5.4)	0.136

Figure 1.15: Killip Class on Admission
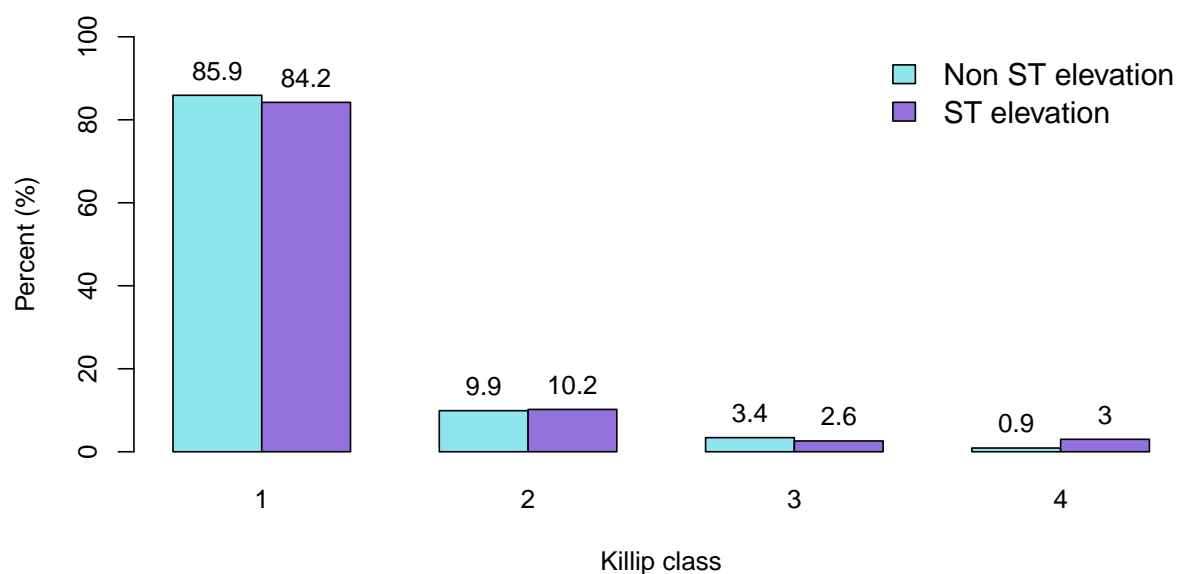
1.5.10 Pre-Hospital Treatment (before ED arrival)

At first medical contact, patients with ST elevation were significantly more likely to receive therapy with aspirin and heparin than patients with non-ST elevation.

Table 1.16 Pre-Hospitalization Treatment

	Total	Non ST elevation	ST elevation	p-value
n[1]	909	411	498	
Aspirin (%)	567 (79.0)	200 (71.7)	367 (83.6)	<0.001
Clopidogrel (%)	11 (1.5)	7 (2.5)	4 (0.9)	0.165
Prasugrel (%)	4 (0.6)	2 (0.7)	2 (0.5)	1.000
Ticagrelor (%)	7 (1.0)	4 (1.4)	3 (0.7)	0.543
Heparin (%)	363 (50.6)	52 (18.6)	311 (70.8)	<0.001
LMWH (%)	9 (1.3)	1 (0.4)	8 (1.8)	0.169

[1] Only MICU and regular ambulance patients were included

Figure 1.16: Pre–Hospitalization Treatment
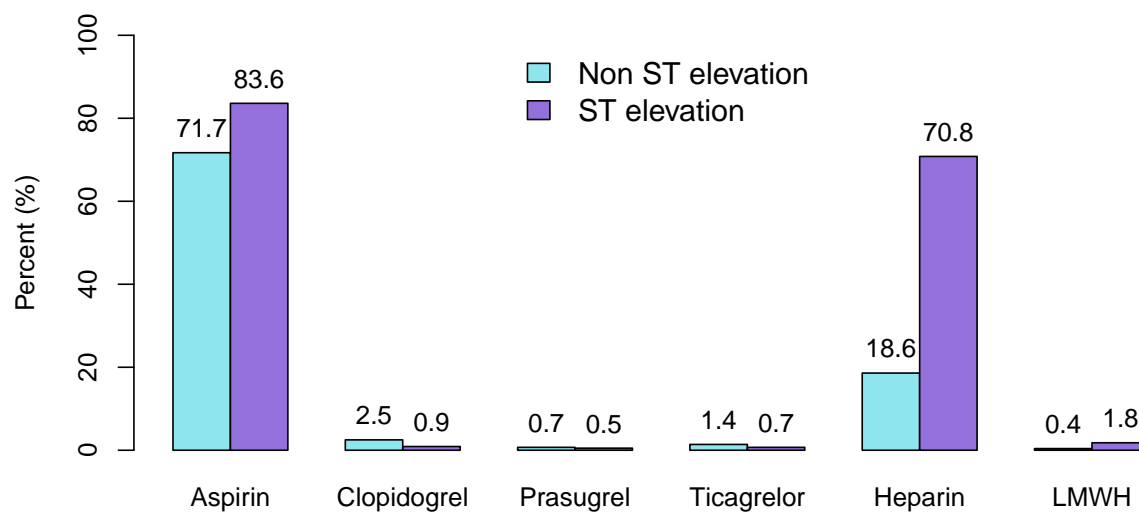
1.6 First Recorded ECG

1.6.1 Location of First ECG Recording

64.9% of patients presenting with non-ST elevation and 34.2% of patients presenting with ST elevation had their first ECG recorded in the emergency department (ED). With respect to the remaining patients, 46% of patients with ST elevation and 17% of those with non-ST elevation had the first ECG performed either at home or in an ambulance, and about 15% in both groups had it performed in a primary clinic.

Figure 1.17: Location of First ECG Recording
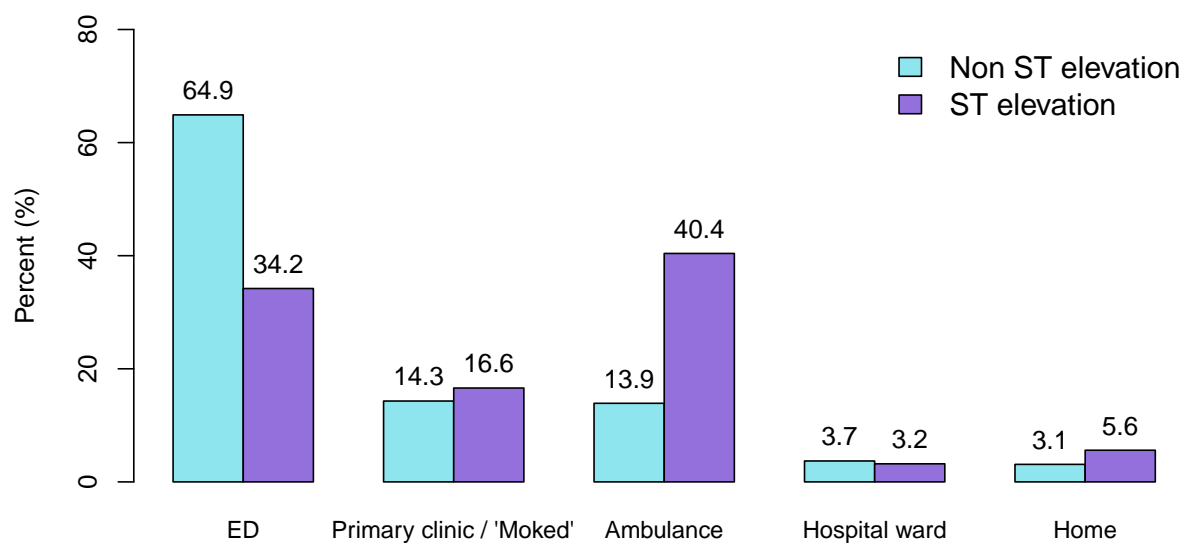
1.6.2 First ECG Rhythm

About 87% of patients presented with a normal sinus rhythm (NSR). 3.1% of patients with ST elevation and 4.4% of those without ST elevation, presented with atrial fibrillation.

Table 1.17: First ECG Rhythm

	Total	Non ST elevation	ST elevation
n	1750	1050	700
NSR (%)	1513 (86.5)	929 (88.5)	584 (83.5)
Atrial fibrillation (%)	68 (3.9)	46 (4.4)	22 (3.1)
S.Tachycardia (%)	84 (4.8)	45 (4.3)	39 (5.6)
S.Bradycardia (%)	24 (1.4)	7 (0.7)	17 (2.4)
VT/VF (%)	24 (1.4)	7 (0.7)	17 (2.4)
II/III AV Block (%)	11 (0.6)	3 (0.3)	8 (1.1)
Asystole (%)	2 (0.1)	0 (0.0)	2 (0.3)
Other (%)	23 (1.3)	13 (1.2)	10 (1.4)

Difference in first ECG rhythm, ST elevation vs. non-ST elevation, p = <0.001

1.7 Primary Reperfusion

1.7.1 Primary Reperfusion Therapy in Patients with ST Elevation

90.7% of patients with ST elevation underwent primary reperfusion within 12 hours from onset of symptoms, mainly primary PCI. In 93.1% of these cases, stents were deployed. Of the remaining 9.3'% which did not undergo primary reperfusion, 90.8% eventually underwent coronary angiography. Of these, 90% underwent revascularization.

Figure 1.18: Primary Reperfusion in Patients with ST Elevation
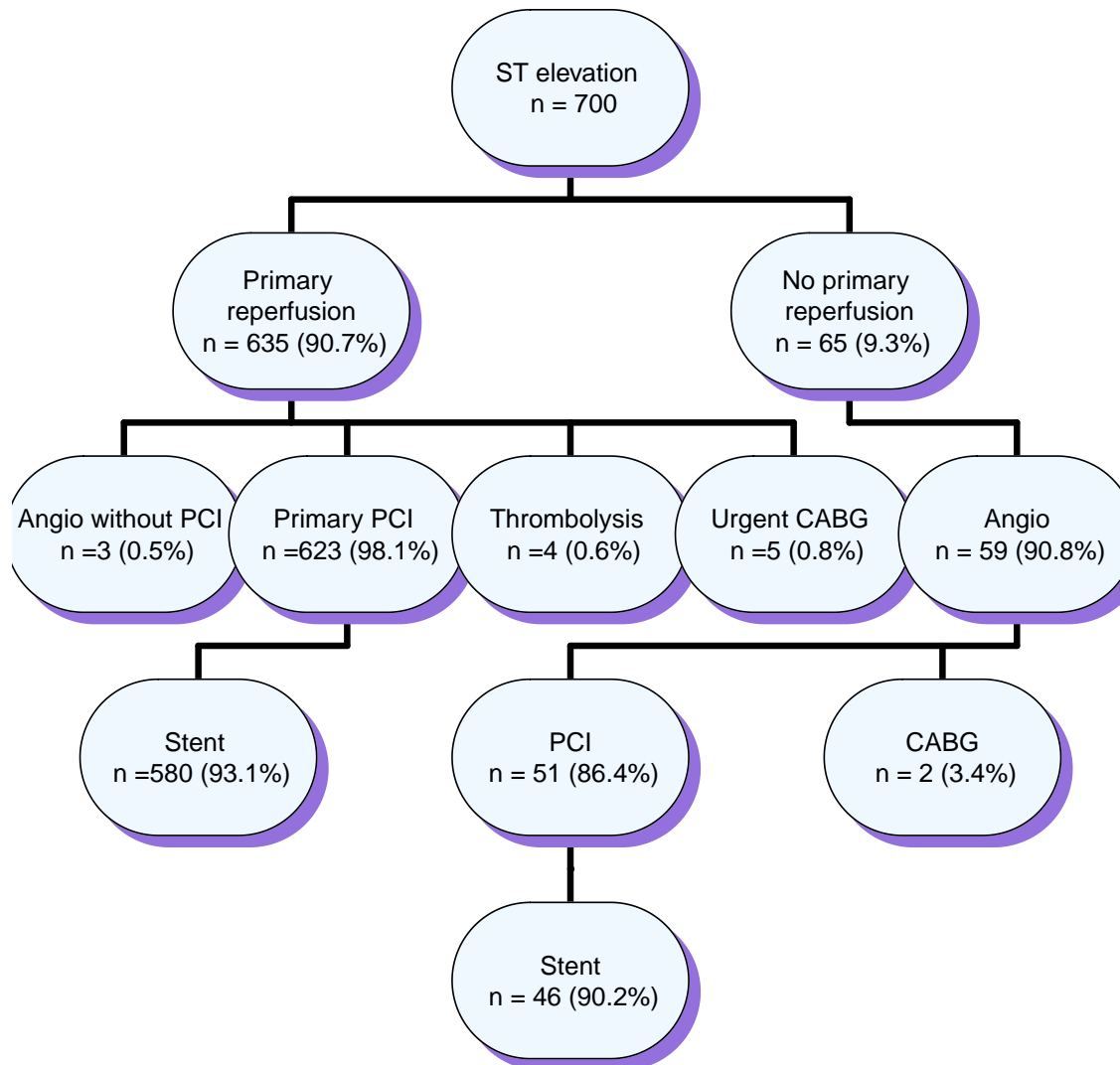
1.7.2 Length of Time from Arrival to Primary Reperfusion

The median time from arrival to primary reperfusion was less than one hour (30.5 minutes).

Table 1.18: Length of Time (minutes) from Arrival to Reperfusion

	N	Time in minutes (median [IQR])
From arrival to thrombolysis	4	30.50 [28.00, 40.46]
From arrival to primary PCI	556	39.00 [14.00, 74.25]

Figure 1.19: Length of Time from Arrival to Reperfusion
(Median, 25%–75%)
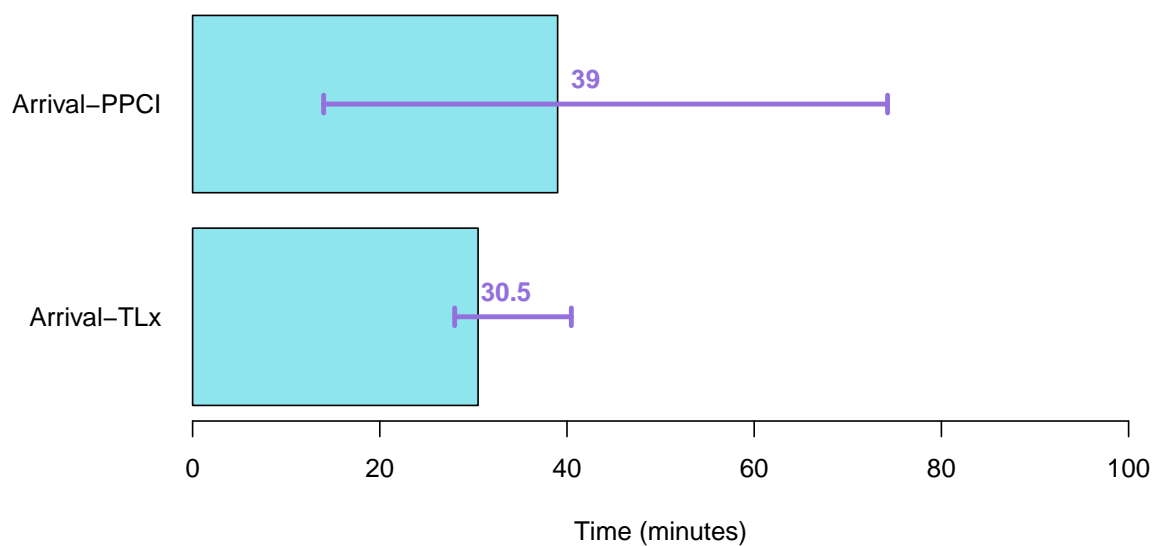
1.7.3 Length of Time from Arrival to Primary Reperfusion, by Gender

The time delay from arrival to primary reperfusion was shorter for men compared to women.

Table 1.19: Length of Time (minutes) from Arrival to Reperfusion, by gender

	Women		Men		
	Time in minutes (median [IQR])	N	Time in minutes (median [IQR])	N	p-value
From arrival to thrombolysis	NA [NA, NA]	0	30.50 [28.00, 40.46]	4	NA
From arrival to primary PCI	51.00 [20.25, 116.75]	118	40.00 [14.00, 82.50]	520	0.041

Figure 1.20: Length of Time from Arrival to Reperfusion by gender
(Median, 25%–75%)
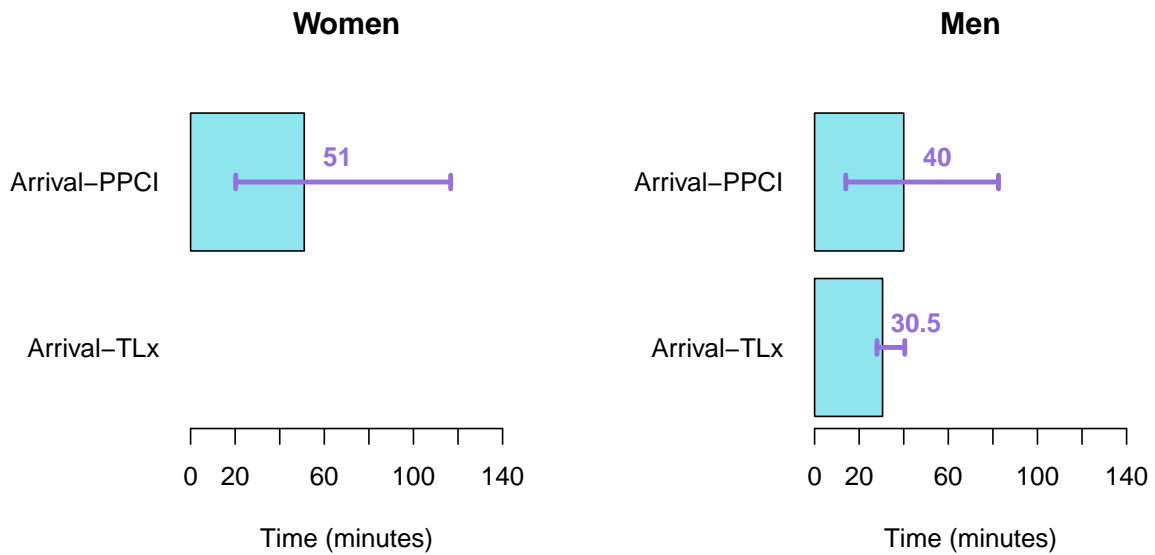
1.7.4 Use of drugs and protective devices during Primary PCI

Table 1.20: Drugs and Protective Devices during Primary Reperfusion

	Overall
n	635
IIb/IIIa antagonists (%)	125 (19.7)
Bivalirudin (%)	17 (2.7)
Aspiration device (%)	50 (7.9)

1.7.5 Primary PCI/Angiography

Table 1.21: Vascular access during Primary Reperfusion

	Overall
n	635
Vascular access	
Femoral	93 (15.0)
Radial	516 (83.4)
Both	10 (1.6)

1.7.6 TIMI Grade Flow of IRA During Primary PCI

In 51.4% of cases, a TIMI flow grade of zero was observed on first injection to the Infarct Related Artery (IRA). Following revascularization, a TIMI grade flow of 3 was achieved in the majority of patients (93.8%).

Table 1.22: TIMI Grade Flow of IRA before and after revascularization

	Before revascularization (%)	After revascularization (%)
n	588	597
0	302 (51.4)	5 (0.8)
1	89 (15.1)	8 (1.3)
2	82 (13.9)	24 (4.0)
3	115 (19.6)	560 (93.8)

1.7.7 Reasons for Not Performing Primary Reperfusion

9.3% of patients presenting with ST elevation did not receive primary reperfusion therapy. In 34.7% the reason was spontaneous reperfusion, in 40.8% the reason was late arrival at the hospital, and in 12.2% of cases primary reperfusion was considered not indicated.

Figure 1.21: Reasons for Not Performing Primary Reperfusion
Number of Patients = 65
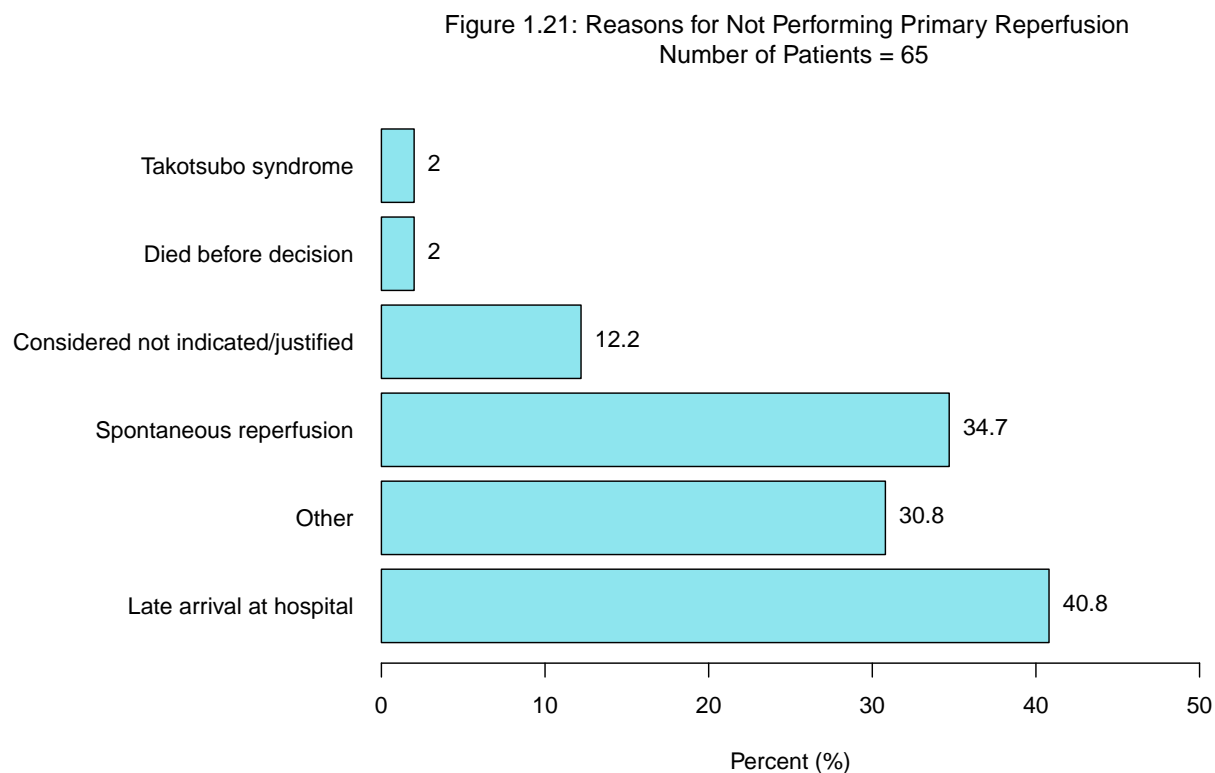
- There were no patients with contraindication to thrombolysis or patient refusal.

1.8 Coronary Interventions and Procedures during Hospitalization

1.8.1 Coronary Angiography and Interventions

Patients with ST elevation were more likely than those with non-ST elevation to undergo coronary angiography and PCI. CABG during hospitalization was performed more frequently in patients with non-ST elevation.

Figure 1.22: In–Hospital Cardiac Interventions and Procedures
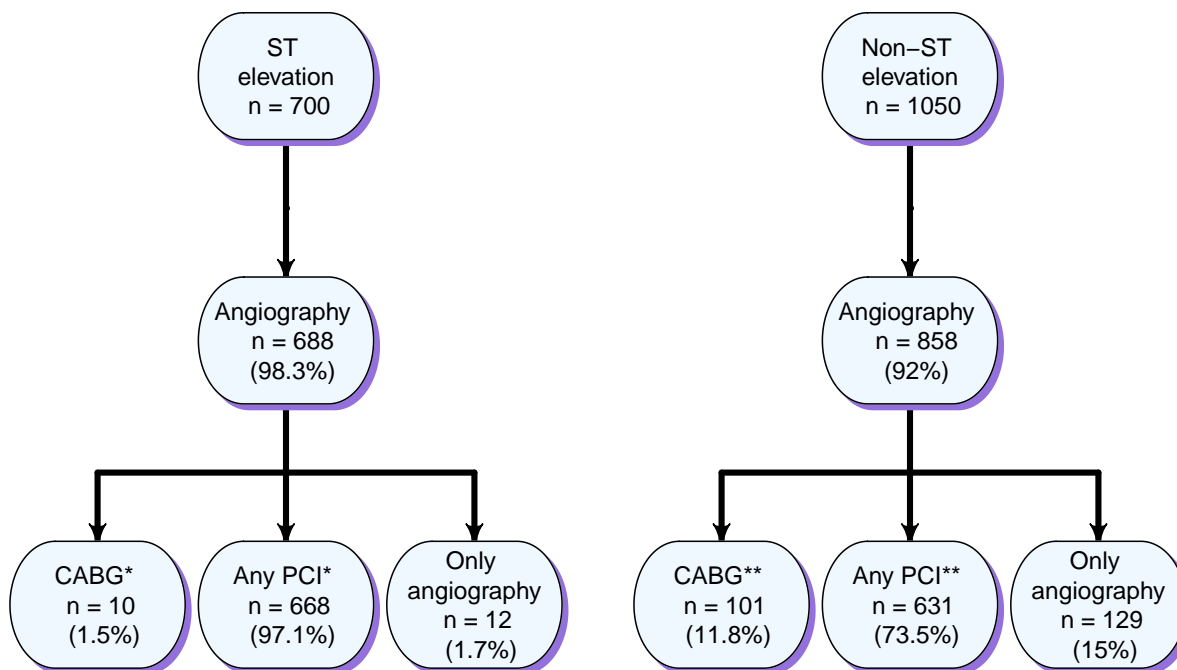
*2 patients underwent both CABG and PCI; ** 6 patients underwent both CABG and PCI.

1.8.2 Coronary Angiography (*excluding primary PCI*)

Table 1.23: Vascular access during coronary angiography

	Overall
n	1048
Coronary angiography	913 (87.2)
Vascular access:	
Femoral	79 (8.8)
Radial	811 (90.1)
Both	10 (1.1)

1.8.3 Other Procedures During Hospitalization

Patients with ST elevation were more likely to receive DC shocks, resuscitation and therapeutic hypothermia than those with non-ST elevation.

Table 1.24: Other Procedures

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
DC shock (%)	49 (2.8)	18 (1.7)	31 (4.4)	0.001
Resuscitation (%)	44 (2.5)	18 (1.7)	26 (3.7)	0.014
Mechanical ventilation (%)				0.067
Invasive	85 (4.9)	41 (3.9)	44 (6.3)	
Non invasive	32 (1.8)	18 (1.7)	14 (2.0)	
IABP (%)	34 (1.9)	18 (1.7)	16 (2.3)	0.496
Dialysis (%)	15 (0.9)	14 (1.3)	1 (0.1)	0.017
AICD/CRT (%)	14 (0.8)	7 (0.7)	7 (1.0)	0.620
Permanent pacemaker (%)	7 (0.4)	4 (0.4)	3 (0.4)	1.000
Temporary pacemaker (%)	15 (0.9)	5 (0.5)	10 (1.4)	0.064
Therapeutic Hypothermia (%)	12 (0.7)	3 (0.3)	9 (1.3)	0.028

1.9 Ejection Fraction

Ejection fraction (EF) was determined in 96.5% of patients with ST elevation and in 91.3% of those with non-ST elevation. EF was normal in a larger proportion of patients with non-ST elevation (48.5%) than in patients with ST elevation (24.5%). 28% of patients with ST elevation and 15.1% of patients with non-ST elevation presented with an EF < 40%.

Table 1.25: Ejection Fraction

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
EF determined (%)	1618 (93.4)	951 (91.3)	667 (96.5)	<0.001
EF (range) (%)				<0.001
Normal (55-65%)	620 (38.6)	457 (48.5)	163 (24.5)	
Preserved (50-54%)	203 (12.6)	123 (13.1)	80 (12.0)	
Mild (40-49%)	456 (28.4)	220 (23.4)	236 (35.5)	
Moderate (30-39%)	262 (16.3)	110 (11.7)	152 (22.9)	
Severe (< 30%)	66 (4.1)	32 (3.4)	34 (5.1)	

Note:

EF range percentages are calculated out of EF determined patients only

out of patients that had documented EF

1.10 In-Hospital Complications

Cardiogenic shock, CHF mild-moderate, hemodynamically significant RV infarction, ventricular fibrillation (VF), new AF and high degree $(2-3^0)$ AVB were more frequent in patients with ST elevation.

Table 1.26: In-Hospital Complications

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
CHF mild-moderate (Killip-2) (%)	148 (8.5)	75 (7.2)	73 (10.5)	0.020
Pulmonary edema (Killip-3) (%)	64 (3.7)	34 (3.2)	30 (4.3)	0.309
Cardiogenic shock (Killip-4) (%)	55 (3.2)	21 (2.0)	34 (4.9)	0.001
Hemodynamically significant RV infarction (%)	13 (0.7)	2 (0.2)	11 (1.6)	0.003
Re-MI (%)	20 (1.1)	14 (1.3)	6 (0.9)	0.494
Post MI angina/re-ischemia (%)	22 (1.3)	16 (1.5)	6 (0.9)	0.314
Stent thrombosis (definite/probable/possible) (%)	11 (0.6)	5 (0.5)	6 (0.9)	0.498
Free wall rupture (%)	3 (0.2)	0 (0.0)	3 (0.4)	0.125
Tamponade (%)	7 (0.4)	3 (0.3)	4 (0.6)	0.587
MR Moderate-severe (%)	31 (1.8)	15 (1.4)	16 (2.3)	0.249
Pericarditis (%)	12 (0.7)	4 (0.4)	8 (1.1)	0.110
Sustained VT (>125 bpm) (%)	23 (1.3)	9 (0.9)	14 (2.0)	0.065
VF (%)	37 (2.1)	12 (1.1)	25 (3.6)	0.001
New AF (%)	66 (3.8)	30 (2.9)	36 (5.2)	0.019
High degree (2-3) AVB (%)	18 (1.0)	6 (0.6)	12 (1.7)	0.037
Asystole (%)	34 (1.9)	16 (1.5)	18 (2.6)	0.166
TIA (%)	4 (0.2)	4 (0.4)	0 (0.0)	0.261
Stroke (%)	6 (0.3)	3 (0.3)	3 (0.4)	0.932
CVA/TIA in hospital (%)	10 (0.6)	7 (0.7)	3 (0.4)	0.746
Acute renal injury (%)	117 (6.7)	64 (6.2)	53 (7.6)	0.278
Sepsis (%)	40 (2.3)	22 (2.1)	18 (2.6)	0.615
Bleeding (%)	39 (2.3)	26 (2.5)	13 (1.9)	0.493
Minor bleeding (%)	13 (0.8)	9 (0.9)	4 (0.6)	0.694
Blood transfusions (%)	26 (1.5)	17 (1.6)	9 (1.3)	0.722

1.11 In-Hospital Medical Treatment

Aspirin, prasugrel, P2Y12, ACE-I/ARB, ~~aldactone~~, beta-blockers, PPI, IV inotropic agent and statins were more frequently used in patients with ST elevation. Clopidogrel, CCB and nitrates were more frequently used among patients with non ST elevation.

All other recommended drugs were similarly given to both groups.

Table 1.27: In-Hospital Medical Treatment

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
Anti-platelets				
Aspirin (%)	1618 (92.5)	950 (90.5)	668 (95.4)	<0.001
P2Y12 (%)	1470 (84.0)	811 (77.2)	659 (94.1)	<0.001
Clopidogrel (%)	480 (27.4)	365 (34.8)	115 (16.4)	<0.001
Prasugrel (%)	476 (27.2)	154 (14.7)	322 (46.0)	<0.001
Ticagrelor (%)	622 (35.5)	360 (34.3)	262 (37.4)	0.195
Anticoagulants				
Oral anticoagulants[1] (%)	100 (5.7)	59 (5.6)	41 (5.9)	0.916
Warfarin (%)	20 (1.1)	8 (0.8)	12 (1.7)	0.108
Dabigatran (%)	4 (0.2)	2 (0.2)	2 (0.3)	1.000
Rivaroxaban (%)	11 (0.6)	8 (0.8)	3 (0.4)	0.578
Apixaban (%)	65 (3.7)	41 (3.9)	24 (3.4)	0.699
Heparin (UFH) (%)	838 (86.1)	726 (86.2)	112 (85.5)	0.930
Bivalirudin (%)	40 (4.1)	37 (4.4)	3 (2.3)	0.379
Other				
ACE-I (%)	752 (43.0)	345 (32.9)	407 (58.1)	<0.001
ARB (%)	191 (10.9)	119 (11.3)	72 (10.3)	0.542
ACE-I/ARB (%)	932 (53.3)	459 (43.7)	473 (67.6)	<0.001
~~Aldactone~~ (%)	212 (12.1)	83 (7.9)	129 (18.4)	<0.001
Beta Blockers (%)	961 (54.9)	506 (48.2)	455 (65.0)	<0.001
Digoxin (%)	4 (0.2)	1 (0.1)	3 (0.4)	0.358
CCB (%)	172 (9.8)	133 (12.7)	39 (5.6)	<0.001
Amiodarone (%)	58 (3.3)	33 (3.1)	25 (3.6)	0.723
Other Anti-Arrhythmic (%)	4 (0.2)	3 (0.3)	1 (0.1)	0.919
Nitrates (%)	89 (5.1)	68 (6.5)	21 (3.0)	0.002
Diuretics (%)	232 (13.3)	147 (14.0)	85 (12.1)	0.294
PPI (%)	972 (55.5)	547 (52.1)	425 (60.7)	<0.001
H2 Blockers (%)	27 (1.5)	19 (1.8)	8 (1.1)	0.363
NSAIDS (%)	2 (0.1)	1 (0.1)	1 (0.1)	1.000
Colchicine (%)	21 (1.2)	9 (0.9)	12 (1.7)	0.165
Steroids (%)	27 (1.5)	19 (1.8)	8 (1.1)	0.363
IV inotropic agent (%)	68 (3.9)	31 (3.0)	37 (5.3)	0.019
Antihyperglycemic[2] (%)	187 (25.2)	109 (22.1)	78 (31.6)	0.007
Statins (%)	1273 (72.7)	695 (66.2)	578 (82.6)	<0.001
Ezetimibe (%)	175 (10.0)	94 (9.0)	81 (11.6)	0.088

[1] Oral anticoagulants include warfarin, dabigatran, rivaroxaban and apixaban

[2] Only among diabetic patients

1.12 Duration of Hospitalization

Table 1.28: Length of Stay in ICCU/Cardiology and Total Hospital Stay

	Total	Non ST elevation	ST elevation
n	1750	1050	700
No. of days in ICCU/Cardiology (median [IQR])	3.00 [2.00, 4.00]	3.00 [2.00, 4.00]	3.00 [2.00, 4.25]
Total hospital days (median [IQR])	3.00 [2.00, 5.00]	3.00 [2.00, 5.00]	4.00 [3.00, 5.00]

1.13 Discharge

1.13.1 Medical Treatment on Discharge

Aspirin, P2Y12 (mainly prasugrel), ACE-I/ARB, ~~aldactone~~, beta-blockers and statins were more often prescribed for patients with ST elevation.
Clopidogrel, oral anticoagulants, apixaban, CCB, nitrates, and diuretics were prescribed more often for patients with non-ST elevation. All other recommended drugs were similarly given to both groups.

Table 1.29.a: Medical Treatment on Discharge among Hospital Survivors

	Total	Non ST elevation	ST elevation	p-value
n	1709	1034	675	
Anti-platelets				
Aspirin (%)	1548 (90.6)	912 (88.2)	636 (94.2)	<0.001
P2Y12 (%)	1493 (87.4)	846 (81.8)	647 (95.9)	<0.001
Clopidogrel (%)	438 (25.6)	335 (32.4)	103 (15.3)	<0.001
Prasugrel (%)	461 (27.0)	148 (14.3)	313 (46.4)	<0.001
Ticagrelor (%)	594 (34.8)	363 (35.1)	231 (34.2)	0.746
Anticoagulants				
Oral anticoagulants[1] (%)	141 (8.3)	96 (9.3)	45 (6.7)	0.067
Warfarin (%)	26 (1.5)	13 (1.3)	13 (1.9)	0.367
Dabigatran (%)	5 (0.3)	3 (0.3)	2 (0.3)	1.000
Rivaroxaban (%)	22 (1.3)	17 (1.6)	5 (0.7)	0.162
Apixaban (%)	88 (5.1)	63 (6.1)	25 (3.7)	0.038
Other				
ACE-I (%)	903 (52.8)	471 (45.6)	432 (64.0)	<0.001
ARB (%)	355 (20.8)	251 (24.3)	104 (15.4)	<0.001
ACE-I/ARB (%)	1253 (73.3)	719 (69.5)	534 (79.1)	<0.001
Aldactone (%)	225 (13.2)	93 (9.0)	132 (19.6)	<0.001
Beta Blockers (%)	1265 (74.0)	737 (71.3)	528 (78.2)	0.002
Digoxin (%)	3 (0.2)	1 (0.1)	2 (0.3)	0.710
CCB (%)	323 (18.9)	257 (24.9)	66 (9.8)	<0.001
Amiodarone (%)	49 (2.9)	35 (3.4)	14 (2.1)	0.150
Other Anti-Arrhythmic (%)	4 (0.2)	4 (0.4)	0 (0.0)	0.269
Nitrates (%)	56 (3.3)	49 (4.7)	7 (1.0)	<0.001
Diuretics (%)	235 (13.8)	166 (16.1)	69 (10.2)	0.001
PPI (%)	1183 (69.2)	732 (70.8)	451 (66.8)	0.091
H2 Blockers (%)	35 (2.0)	24 (2.3)	11 (1.6)	0.417
Colchicine (%)	34 (2.0)	21 (2.0)	13 (1.9)	1.000
Steroids (%)	26 (1.5)	18 (1.7)	8 (1.2)	0.474
Antihyperglycemic[2] (%)	418 (58.1)	275 (56.8)	143 (60.9)	0.343
GLP1[2] (%)	42 (5.8)	29 (6.0)	13 (5.5)	0.939
SGLT2[2] (%)	265 (36.9)	170 (35.1)	95 (40.4)	0.194
Statins (%)	1601 (93.7)	957 (92.6)	644 (95.4)	0.023
Ezetimibe (%)	275 (16.1)	168 (16.2)	107 (15.9)	0.881

[1] Oral anticoagulants include warfarin, dabigatran, rivaroxaban and apixaban

[2] Only among diabetic patients

1.13.2 Discharged to
Destination

Table 1.29.b: Discharged to

	Total	Non ST elevation	ST elevation
n	1709	1034	675
Discharged to			
Home	1438 (84.9)	864 (84.2)	574 (85.9)
Internal medicine	121 (7.1)	48 (4.7)	73 (10.9)
Cardiothoracic surgery	88 (5.2)	78 (7.6)	10 (1.5)
Other hospital	24 (1.4)	20 (1.9)	4 (0.6)
Other ward	19 (1.1)	13 (1.3)	6 (0.9)
Nursing home	4 (0.2)	3 (0.3)	1 (0.1)

1.14 Mortality and Major Adverse Cardiac Event (MACE)

1.14.1 Rates of Mortality and MACE by ECG on Admission

Unadjusted rates of in-hospital mortality, 7- and 30- days mortality were significantly higher for patients with ST elevation compared to those with non-ST elevation.
MACE (Major Adverse Cardiac Events), which included recurrent MI or UAP, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up) or death occurring within 30 days from hospitalization, was not significantly different in patients with and without ST elevation.

Table 1.30: Unadjusted Rates of 7-Day, 30-Day and 1-year mortality, 30-Day MACE[1]

	Total	Non ST elevation	ST elevation	p-value
n	1750	1050	700	
In-hospital mortality (%)	39 (2.2)	16 (1.5)	23 (3.3)	0.022
7-day mortality (%)	33 (1.9)	11 (1.1)	22 (3.1)	0.003
30-day mortality (%)	44 (2.5)	16 (1.5)	28 (4.0)	0.002
MACE[1] (%)	172 (9.8)	111 (10.6)	61 (8.7)	0.224
1-year mortality (%)	94 (5.4)	55 (5.3)	39 (5.6)	0.857

[1] Definition of MACE includes: recurrent MI, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up), UAP or death occurring within 30 days from hospitalization

Figure 1.23: Unadjusted Rates of In–Hospital, 7–Day & 30–Day Mortality and 30–Day MACE
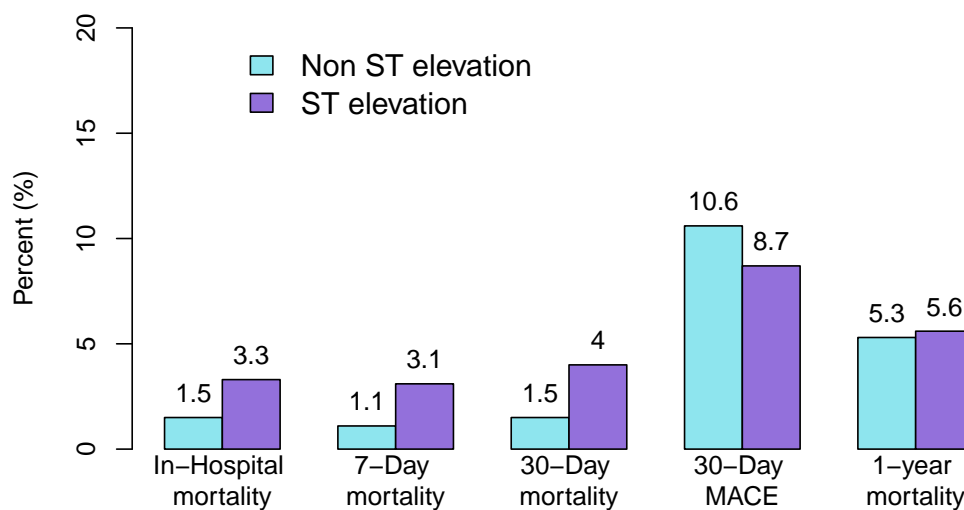
After adjustment for age and other risk factors, 7-day mortality rates were significantly higher for patients with ST elevation compared to those with non-ST elevation.

Table 1.31: Mortality Rates by ECG on Admission Adjusted for Age and Other Risk Factors

	OR (STEMI vs. NSTEMI) with 95% CI	
	Age adjusted	Risk factors adjusted[1]
In-Hospital	2.79 (1.46,5.47)	2.8 (1.26,6.48)
7-Days	3.88 (1.89,8.44)	6.58 (2.47,20.11)
30-Days	3.33 (1.8,6.4)	3.74 (1.68,8.89)
MACE[2]	0.86 (0.61,1.19)	0.9 (0.62,1.31)
1-year	1.33 (0.86,2.05)	1.4 (0.82,2.39)

[1] Adjusted for age, gender, past ACS, diabetes, hypertension, killip class ≥ 2, any angiography

[2] Definition includes: recurrent MI, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up) or death occurring within 30 days from hospitalization

1.14.2 Rates of Mortality and MACE by Gender

Table 1.32: Unadjusted Rates of In-Hospital Mortality, 7-Day Mortality, 30-Day Mortality and 30-Day MACE, by Gender

	Total	Women	Men	p-value
n	1750	359	1391	
In-hospital mortality (%)	39 (2.2)	14 (3.9)	25 (1.8)	0.026
7-day mortality (%)	33 (1.9)	10 (2.8)	23 (1.7)	0.237
30-day mortality (%)	44 (2.5)	12 (3.3)	32 (2.3)	0.353
MACE[1] (%)	172 (9.8)	37 (10.3)	135 (9.7)	0.818
1-year mortality (%)	94 (5.4)	29 (8.1)	65 (4.7)	0.016

[1] Definition includes: recurrent MI, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up), UAP or death occurring within 30 days from hospitalization

Table 1.33: Odds Ratios for Mortality and MACE by Gender Adjusted for Age and Other Risk Factors

	OR (Women vs. Men) with 95% CI	
	Age Adjusted	Risk factors Adjusted[1]
In-Hospital mortality	1.44 (0.7,2.84)	0.88 (0.36,1.99)
7-Days mortality	1.09 (0.48,2.31)	0.56 (0.19,1.47)
30-Days mortality	1.01 (0.48,1.97)	0.6 (0.23,1.39)
MACE[2]	0.94 (0.63,1.39)	0.81 (0.52,1.25)
1-year mortality	1.18 (0.73,1.89)	0.85 (0.47,1.49)

[1] Adjusted for age, past ACS, diabetes, hypertension, killip class $\geq$ 2, any angiography

[2] Definition includes: recurrent MI, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up), UAP or death occurring within 30 days from hospitalization.

1.15 Re-Hospitalization within 90 Days of Admission

Re-hospitalization rates for patients with and without ST elevation were similar. Differences in reasons for re-hospitalization were not statistically significant.

Table 1.34: Re-Hospitalization within 90 Days of Admission

	Total	Non ST elevation	ST elevation	p-value
All patients				
n	1709	1034	675	
Re-hospitalization[1] (%)	376 (25.9)	232 (26.9)	144 (24.4)	0.321
Re-hospitalized patients only				
n	376	232	144	
Scheduled (%)	156 (42.2)	83 (36.6)	73 (51.0)	0.008
Scheduled due to cardiac reason (%)	134 (85.9)	67 (80.7)	67 (91.8)	0.080
Non-Scheduled (%)	214 (57.8)	144 (63.4)	70 (49.0)	0.008
Non-Scheduled due to cardiac reason (%)	129 (60.3)	88 (61.1)	41 (58.6)	0.836

[1] Re-hospitalization among hospital survivors

Chapter 2: Temporal Trends 2010-2021

Temporal Trends in Characteristics, Management, and Outcome of Patients with ACS in Cardiology: 2010-2021

why the empty space ? figure ?

2.1 Patients' Characteristics

Table 2.1: Patients' Characteristics

	2010	2013	2016	2018	2021	p for trend
n	1779	1885	1791	1778	1750	
Gender (Male) (%)	1378 (77.5)	1453 (77.1)	1414 (79.0)	1427 (80.3)	1391 (79.5)	0.018
Age (%)						0.013
$\leq$ 50	272 (15.3)	297 (15.8)	246 (13.7)	260 (14.6)	244 (13.9)	
50-75	1158 (65.1)	1195 (63.4)	1162 (64.9)	1158 (65.2)	1200 (68.6)	
> 75	349 (19.6)	393 (20.8)	382 (21.3)	357 (20.1)	306 (17.5)	
Age (mean (sd))	63.64 (12.67)	63.97 (12.91)	64.67 (12.82)	64.28 (12.69)	64.20 (12.31)	0.105

2.2 Cardiovascular History and Risk Factors

Table 2.2.a: Cardiovascular History and Risk Factors

	2010	2013	2016	2018	2021	p for trend
n	1779	1885	1791	1778	1750	
CV history						
MI (%)	32.0	30.4	37.2	38.8	37.3	<0.001
Prior PCI (%)	33.8	34.2	33.4	35.2	34.9	0.358
CABG (%)	10.0	9.1	8.8	9.1	7.3	0.014
CHF (%)	8.5	7.9	6.7	10.4	7.1	0.913
Stroke/TIA (%)	8.2	8.4	8.2	9.2	8.8	0.304
Chronic renal failure (%)	12.0	12.6	11.4	11.4	10.5	0.08
PVD (%)	8.2	7.1	6.0	7.8	7.3	0.635
Risk factors						
Hypertension (%)	66.0	66.1	64.7	67.3	63.4	0.252
Diabetes (%)	38.0	39.1	41.5	41.8	42.4	0.002
Dyslipidemia (%)	75.3	75.9	72.7	71.0	70.4	<0.001
Current smoker (%)	38.4	39.3	38.5	43.0	41.3	0.009
Past smoker (%)	24.7	20.6	21.1	18.7	18.9	<0.001
Family Hx of CAD (%)	31.2	28.8	33.4	34.0	28.9	0.8

CKD [annotation pointing to Chronic renal failure row]

Table 2.2.b: Prior Chronic Treatment

	2010	2013	2016	2018	2021	p for trend
n	1779	1885	1791	1778	1750	
Aspirin (%)	49.7	49.5	44.9	41.2	39.3	<0.001
P2Y12 inhibitors (%)	12.8	14.9	13.5	14.7	12.0	0.503
Clopidogrel (%)	25.2	22.9	16.4	16.6	10.5	<0.001
Prasugrel (%)	0.0	1.0	1.3	1.1	1.5	<0.001
Ticagrelor (%)	0.0	0.5	1.5	3.0	1.7	<0.001
Beta Blockers (%)	38.9	37.1	34.8	31.2	28.6	<0.001
ACE-I/ARB (%)	42.5	41.7	42.2	38.3	35.5	<0.001
Statins (%)	52.7	51.2	50.7	42.4	41.1	<0.001
LLD (%)	53.5	51.8	50.7	43.0	41.5	<0.001
Digoxin (%)	0.7	0.7	0.3	0.2	0.2	0.005
Diuretic (%)	18.4	15.6	13.5	10.7	6.6	<0.001
Nitrates (%)	7.8	5.5	3.7	3.5	1.1	<0.001

Figure 2.1: Trends in Prior Chronic Treatment
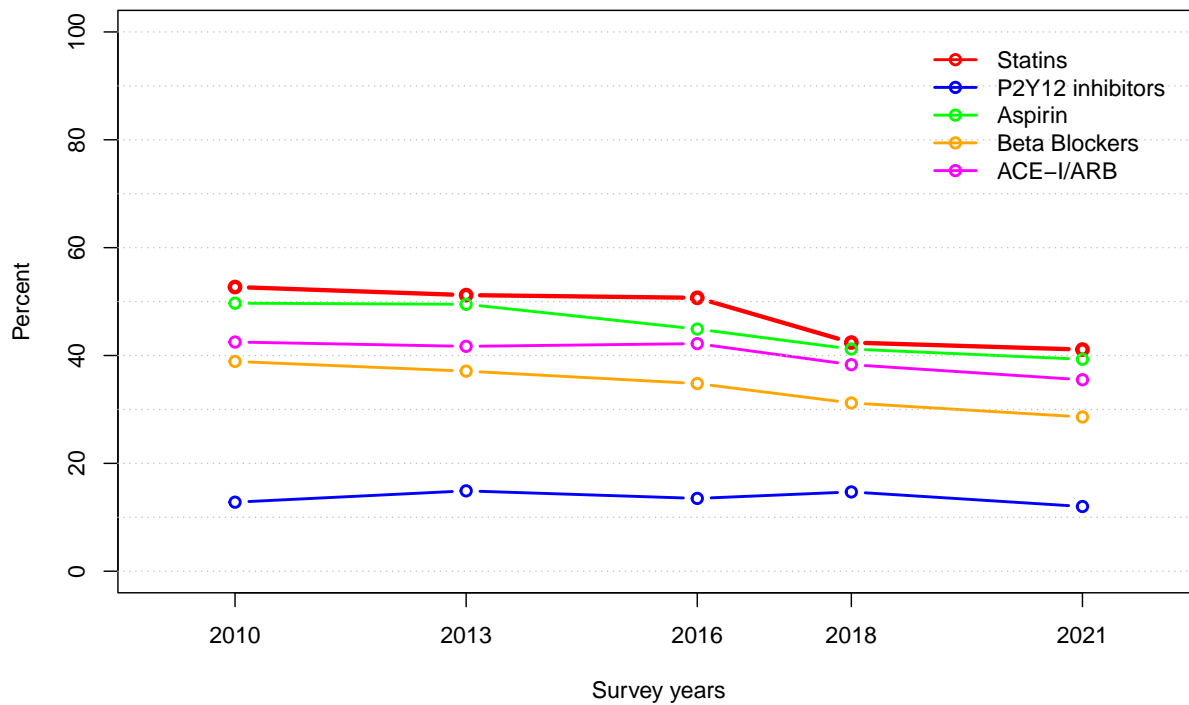
2.3 Admission Information

2.3.1 Initial Ward of Hospitalization

Table 2.3: Initial Ward of Hospitalization

	2010	2013	2016	2018	2021
n	1779	1885	1791	1778	1750
Ward (%)					
Cardiology/ICCU	89.0	84.8	86.8	86.4	88.3
Internal Medicine	9.4	13.5	12.3	12.4	10.5
Other	1.5	1.8	0.9	1.1	1.2

p for trend 0.499

2.3.2.a ECG on Admission

Table 2.4: ECG on Admission

	2010	2013	2016	2018	2021
n	1779	1885	1791	1778	1750
ST elevation	43.6	39.7	39.8	39.7	40.3
Non ST elevation	56.4	60.3	60.2	60.3	59.7

p for trend 0.074

2.3.2.b Diagnosis at Discharge

Table 2.5: Diagnosis at Discharge

	2010	2013	2016	2018	2021
n	1779	1885	1791	1778	1750
NSTE-ACS	57.3	61.4	60.5	61.2	60.0
STE-ACS	42.7	38.6	39.5	38.8	40.0

p for trend 0.163

2.3.3 Killip Class on Admission

Table 2.6: Killip Class on Admission

	2010	2013	2016	2018	2021
n	1779	1885	1791	1778	1750
Killip class (%)					
1	87.2	87.6	90.5	87.4	85.2
2	6.7	7.1	5.6	6.8	10.0
3	4.3	3.3	2.5	3.7	3.0
4	1.8	1.9	1.4	2.1	1.7

p for trend 0.73

2.4 Primary Reperfusion Therapy in Patients with ST Elevation

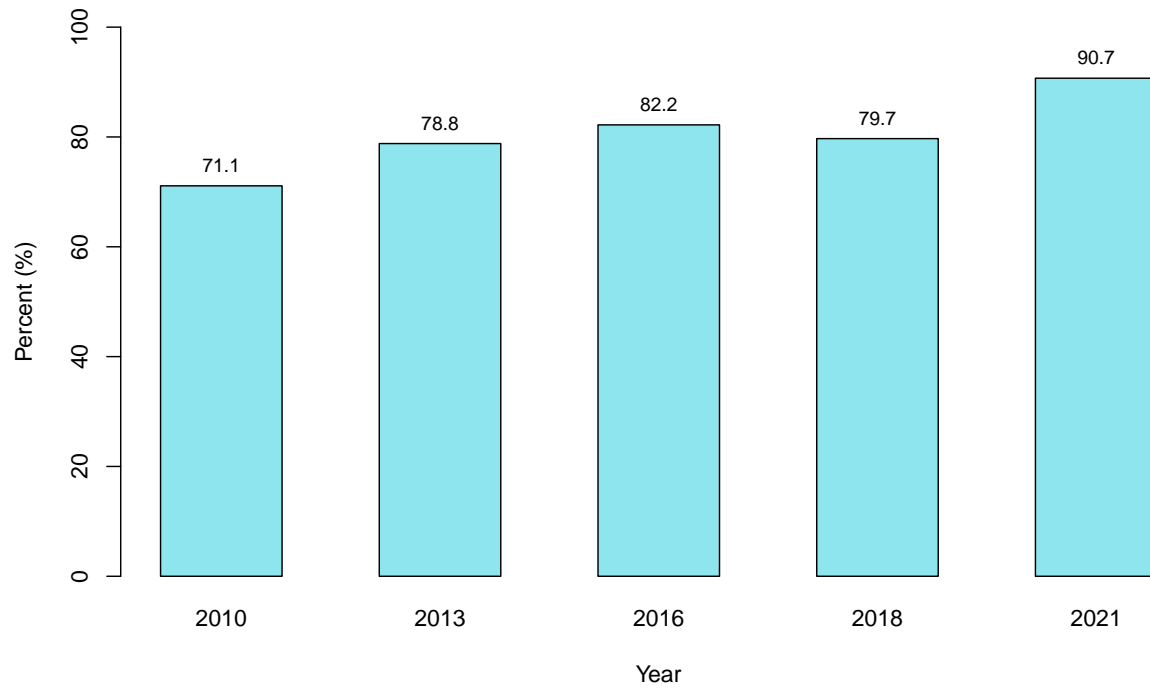Figure 2.2: Primary Reperfusion among Patients with ST Elevation

Figure 2.3: Type of Primary Reperfusion among Patients with ST Elevation
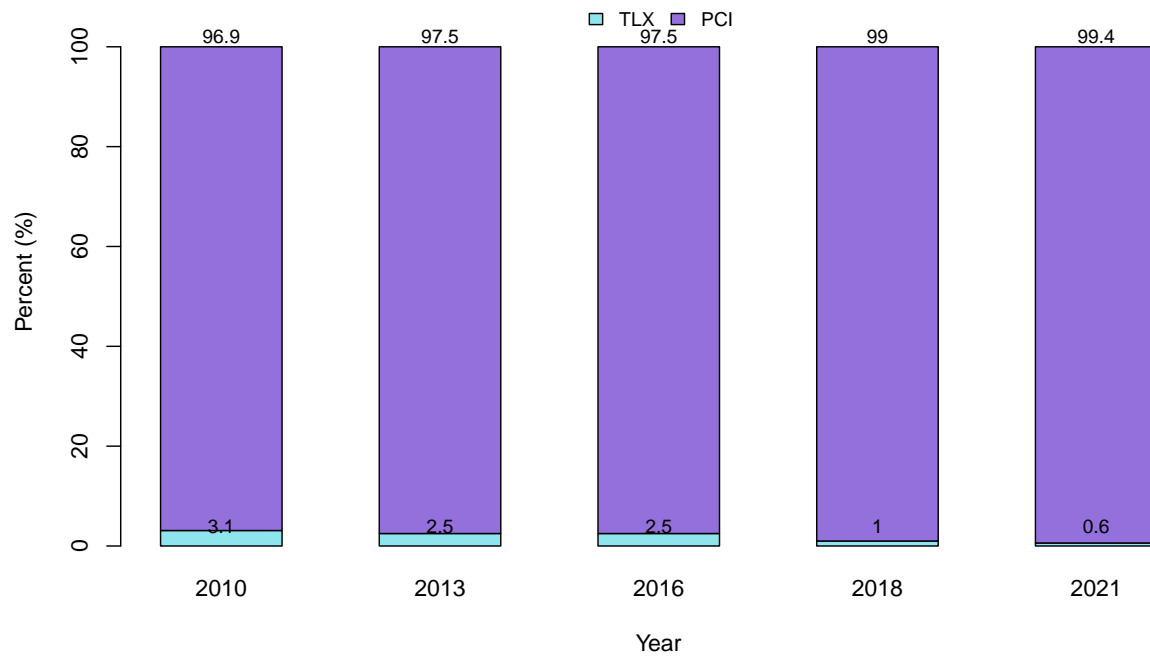
2.4.1 Primary PCI/Angiography

Table 2.7.1: Vascular access during Primary Reperfusion

	2010	2013	2016	2018	2021
n	555	596	603	574	635
Vascular access, n (%):					
Femoral	374 (72.3)	225 (39.5)	126 (21.6)	113 (20.2)	89 (14.4)
Radial	143 (27.7)	345 (60.5)	449 (76.9)	437 (78.2)	519 (83.8)
Both	0 (0.0)	0 (0.0)	9 (1.5)	9 (1.6)	11 (1.8)

2.4.2 Coronary angiography (*excluding primary PCI*)

Table 2.7.2: Vascular access during coronary angiography

	2010	2013	2016	2018	2021
n (excluding primary PCI)	1260	1317	1226	1229	1048
Coronary angiography, n (%)	1057 (84.0)	1080 (82.1)	1079 (88.2)	1093 (88.9)	913 (87.2)
Vascular access, n (%):					
Femoral	0 (NaN)	0 (NaN)	176 (16.4)	91 (11.5)	79 (8.8)
Radial	0 (NaN)	0 (NaN)	882 (82.0)	679 (85.5)	811 (90.1)
Both	0 (NaN)	0 (NaN)	18 (1.7)	24 (3.0)	10 (1.1)

2.5 Time Intervals in STEMI Patients

Table 2.8.1: Primary reperfusion among STEMI patients

	2010	2013	2016	2018	2021
n	760	727	708	690	700
Primary reperfusion, n (%)	540 (71.1)	573 (78.8)	582 (82.2)	550 (79.7)	635 (90.7)

Table 2.8.2: Time Intervals in STEMI reperfused patients in PPCI (minutes)

	2010	2013	2016	2018	2021	p for trend
n	503	536	544	526	610	
Symptom onset to ER arrival (median [IQR])	111.00 [68.50, 213.50]	129.00 [74.00, 242.25]	117.00 [70.00, 195.00]	120.00 [75.00, 212.00]	121.50 [71.00, 324.75]	0.001
ER arrival to primary PCI (door to balloon) (median [IQR])	65.00 [36.50, 109.50]	66.00 [35.00, 101.00]	50.00 [25.25, 84.75]	48.00 [25.25, 79.00]	39.00 [14.00, 74.25]	<0.001
Onset to balloon (median [IQR])	195.00 [130.00, 331.00]	196.50 [140.00, 350.00]	170.00 [120.00, 287.00]	178.00 [120.00, 277.50]	175.00 [104.00, 422.00]	0.154
Door to balloon ≤ 90 min. (%)	326 (66.9)	345 (70.6)	406 (79.0)	367 (82.3)	456 (82.0)	<0.001

Table 2.9: Time Intervals (minutes) in STEMI reperfused patient in PPCI, by gender

	2010	2013	2016	2018	2021	p for trend
Men						
n	409	449	440	442	501	
Symptom onset to ER arrival (median [IQR])	110.00 [66.00, 210.00]	126.00 [70.00, 239.00]	117.00 [65.00, 191.00]	119.50 [70.75, 214.00]	119.50 [68.00, 297.50]	0.003
ER arrival to primary PCI (door to balloon) (median [IQR])	64.00 [36.00, 101.00]	66.00 [35.00, 101.50]	49.00 [25.00, 83.00]	46.50 [25.00, 73.00]	36.00 [11.25, 71.75]	<0.001
Onset to balloon (median [IQR])	188.00 [124.75, 322.25]	195.00 [135.00, 345.00]	165.00 [115.00, 270.00]	172.00 [116.00, 269.75]	166.00 [100.00, 375.50]	0.377
Women						
n	94	87	104	84	109	
Symptom onset to ER arrival (median [IQR])	127.00 [86.00, 240.00]	147.00 [87.00, 330.00]	118.00 [91.00, 227.75]	125.00 [79.00, 200.00]	162.50 [91.75, 411.25]	0.095
ER arrival to primary PCI (door to balloon) (median [IQR])	78.50 [40.00, 133.50]	62.00 [30.75, 98.25]	58.50 [29.25, 92.00]	58.00 [28.00, 104.00]	50.50 [19.25, 85.00]	0.225
Onset to balloon (median [IQR])	249.00 [154.00, 369.00]	212.00 [152.00, 385.00]	188.00 [144.00, 385.00]	190.00 [150.00, 300.00]	227.00 [137.00, 549.75]	0.159

2.6 Procedures during Hospitalization

Table 2.10 Procedures during Hospitalization

	2010	2013	2016	2018	2021	p for trend
n	1779	1885	1791	1778	1750	
Coronary Angiography (%)	89.7	88.9	93.3	93.1	94.5	<0.001
Any PCI (%)	71.3	69.2	72.0	63.6	78.9	0.006
Stent (%)	90.8	91.9	94.0	95.2	93.9	<0.001
CABG (%)	1.7	4.7	3.5	3.5	6.7	<0.001
IABP (%)	4.6	2.3	2.2	2.0	1.9	<0.001

Trends in procedures performed during hospitalisation.

Figure 2.4: Trends in Hospital Procedures
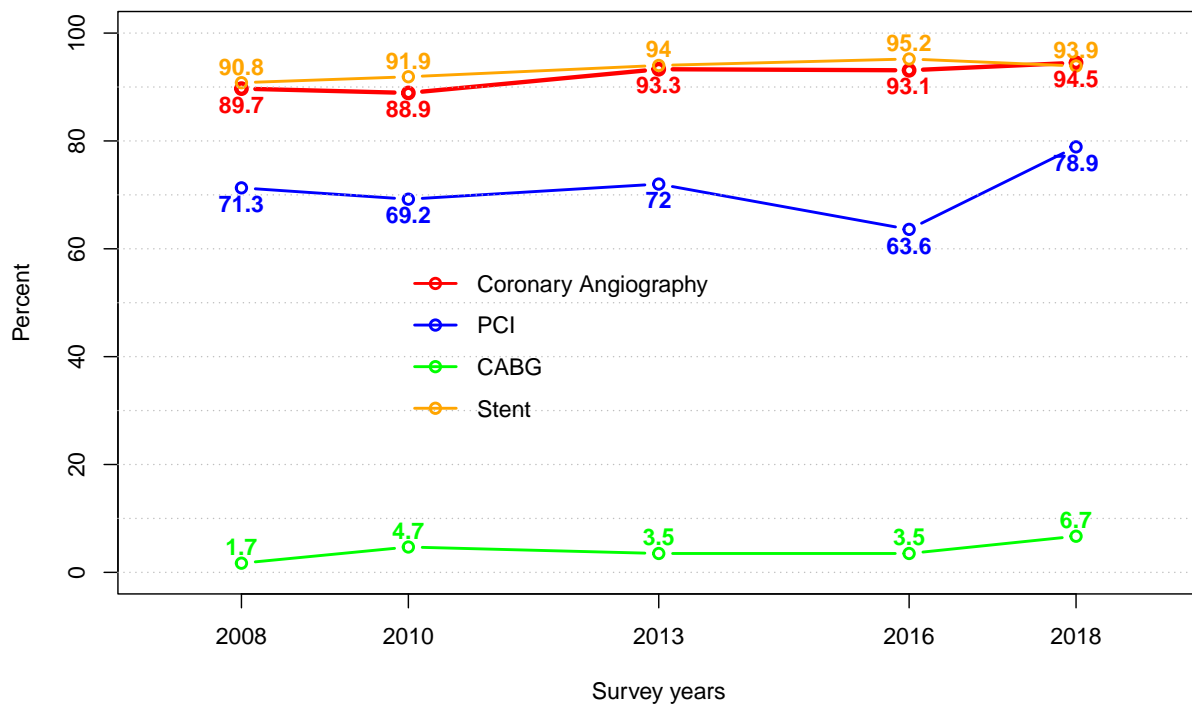
2.7 In-Hospital Complications

Table 2.11: In-Hospital Complications

	2010	2013	2016	2018	2021	p for trend
n	1779	1885	1791	1778	1750	
Re-MI (%)	1.1	1.0	0.5	0.6	1.1	0.773
Post MI angina/Re-ischemia (%)	2.0	2.0	1.3	1.2	1.3	0.014
Sub-Acute Stent Thrombosis (%)	0.6	0.8	0.7	0.3	0.6	0.502
Mild-moderate CHF (Killip 2) (%)	7.8	6.1	5.9	7.4	8.5	0.182
Pulmonary edema (Killip 3) (%)	4.9	4.4	3.1	3.3	3.7	0.013
Cardiogenic shock (Killip 4) (%)	3.1	3.3	2.0	3.1	3.2	0.869
Free wall rupture (%)	0.1	0.1	0.2	0.1	0.2	0.492
Tamponade (%)	0.3	0.0	0.2	0.2	0.4	0.218
Moderate-severe MR (%)	1.7	2.1	1.1	0.8	1.8	0.211
Sustained VT (%)	1.3	1.3	1.1	1.1	1.3	0.786
High degree AVB (2-3) (%)	2.1	1.5	1.4	1.5	1.0	0.013
Primary VF (%)	1.9	1.2	1.3	1.3	1.4	0.353
Secondary VF (%)	0.6	0.5	0.6	0.5	0.7	0.769
Asystole (%)	1.9	1.9	1.3	2.0	1.9	0.818
TIA (%)	0.1	0.2	0.1	0.3	0.2	0.194
Stroke (%)	0.5	0.6	0.5	0.5	0.3	0.373
Acute renal injury (%)	6.1	4.6	5.1	4.9	6.7	0.341
Bleeding (%)	2.4	0.9	1.8	2.8	2.3	0.105

2.8 In-Hospital Treatment

Table 2.12: In-Hospital Treatment

	2010	2013	2016	2018	2021	p for trend
n	1779	1885	1791	1778	1750	
Aspirin (%)	98.2	97.8	97.3	94.2	92.5	<0.001
P2Y12 inhibitors (%)	95.5	93.9	92.1	90.9	88.7	<0.001
Clopidogrel (%)	94.9	45.4	31.6	26.7	25.3	<0.001
Prasugrel (%)	0.3	30.1	25.6	19.5	26.9	<0.001
Ticagrelor (%)	0.3	18.4	35.0	44.7	36.6	<0.001
Beta Blockers (%)	86.1	82.3	79.7	74.0	75.1	<0.001
ACE-I/ARB (%)	83.2	80.2	76.7	74.2	74.9	<0.001
Statins (%)	97.8	94.1	95.3	94.7	94.2	<0.001
LLDs (%)	97.9	94.2	95.3	94.7	94.9	0.001
Digoxin (%)	1.4	1.1	1.1	0.6	0.2	<0.001
Diuretic (%)	27.3	24.8	19.0	15.2	13.3	<0.001
Nitrates (%)	23.7	16.6	11.5	7.5	5.1	<0.001
Anticoagulant[1] (%)	47.6	44.8	37.0	30.8	5.7	<0.001

[1] Anticoagulants include warfarin, LMWH and NOACs in the years applicable

Figure 2.5: Trends in Hospital Treatment
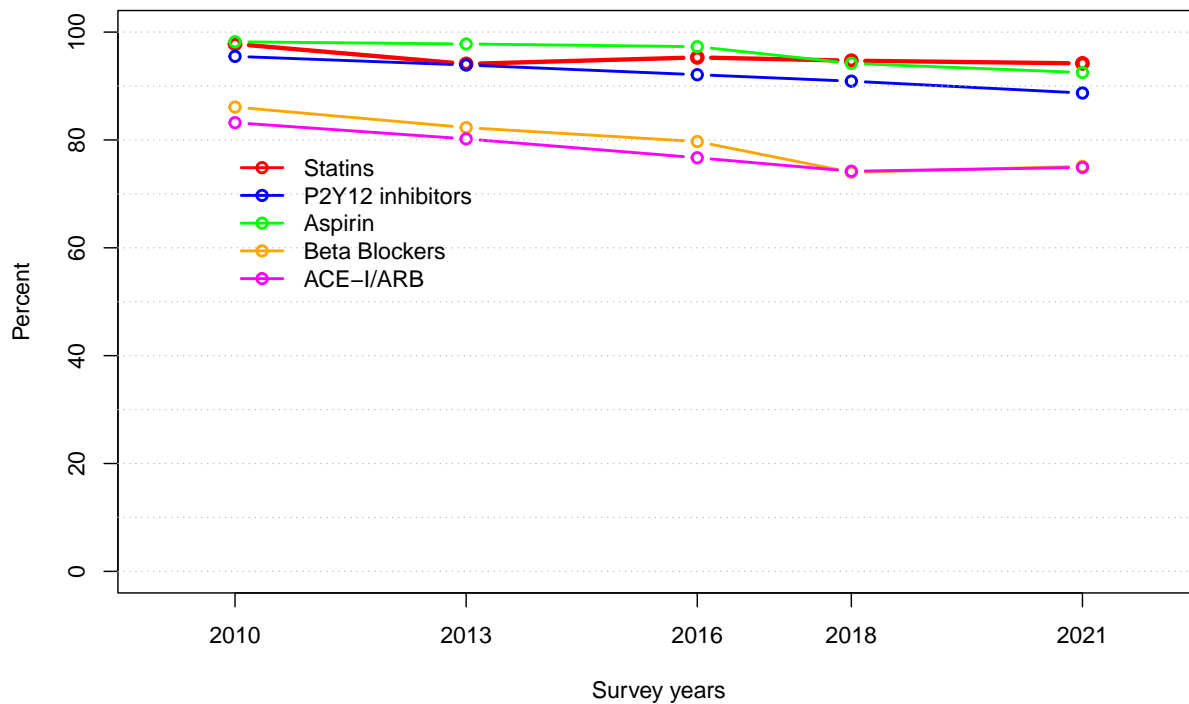
2.9 Medical Treatment on Discharge

Table 2.13: Medical Treatment on Discharge among Hospital Survivors

	2010	2013	2016	2018	2021	p for trend
n	1741	1848	1761	1726	1709	
Aspirin (%)	96.7	95.5	95.0	95.0	90.6	<0.001
Beta Blockers (%)	82.0	78.4	76.1	73.6	74.0	<0.001
P2Y12 inhibitors (%)	86.5	85.6	88.0	91.5	87.4	0.002
Clopidogrel (%)	85.9	42.5	31.9	26.4	25.6	<0.001
Prasugrel (%)	0.3	27.7	24.9	20.0	27.0	<0.001
Ticagrelor (%)	0.3	15.4	31.2	45.1	34.8	<0.001
ACE-I/ARB (%)	80.5	76.8	74.1	75.6	73.3	<0.001
Statins (%)	96.0	93.3	93.3	95.9	93.7	0.242
LLDs (%)	96.2	93.5	93.3	94.6	94.6	0.229
Digoxin (%)	1.0	0.9	1.1	0.5	0.2	0.001
Diuretic (%)	22.5	19.6	18.5	16.5	13.8	<0.001
Nitrates (%)	6.7	7.6	4.4	5.6	3.3	<0.001
GLP-1[1] (%)	0.0	0.0	0.5	1.0	2.0	<0.001
Anticoagulant[2] (%)	9.7	14.6	11.9	12.6	8.3	0.041

[1] Only among diabetic patients

[2] Anticoagulants include warfarin, LMWH and NOACs in the years applicable

Figure 2.6: Medical Treatment in Discharge among Hospital Survivors
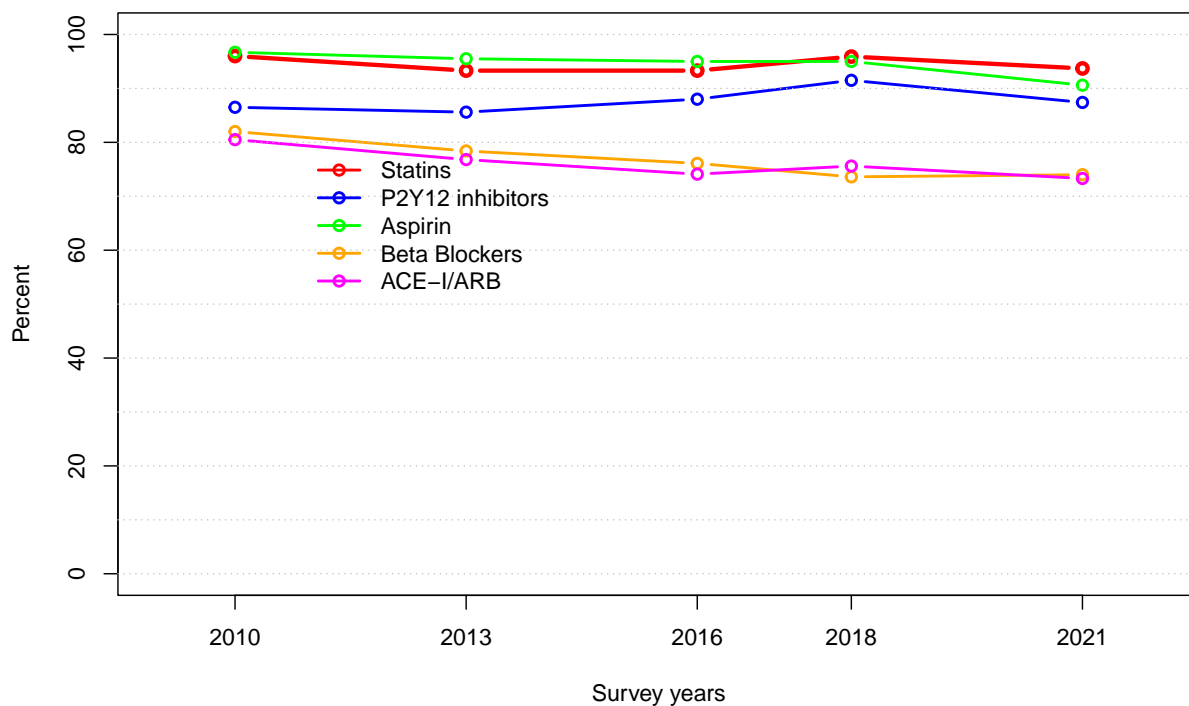
2.10 Short and long Term Outcomes

Table 2.14: Rates of Mortality and MACE[1]

	2010	2013	2016	2018	2021	p for trend
n	1779	1885	1791	1778	1750	
Mortality						
In-hospital	2.1	2.0	1.7	2.9	2.2	0.288
7-day	2.2	1.8	1.6	2.7	1.9	0.775
30-day	4.2	3.7	3.0	4.3	2.5	0.043
1 year	8.1	8.3	7.8	8.9	5.4	0.011
MACE[1]						
30-day MACE	10.3	10.4	8.9	8.4	9.8	0.181

[1] 30 day MACE: Death/UAP/MI-isch/CVA/St.thromb/Follow-up urg. revasc

stent thrombosis

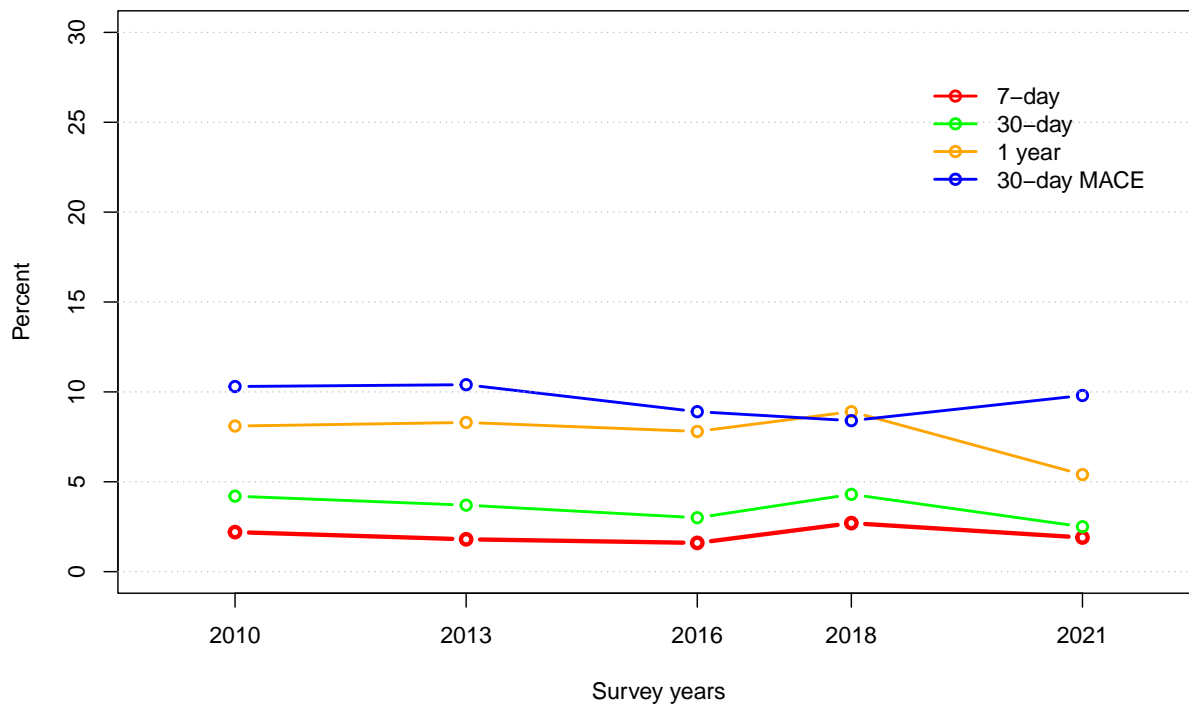Figure 2.7: Rates of Mortality and 30–day MACE

Table 2.15: Rates of Mortality and MACE[1] by Gender

	2010	2013	2016	2018	2021	p for trend
–Men–						
n	1378	1453	1414	1427	1391	
Mortality						
In-hospital	2.0	1.5	1.3	2.5	1.8	0.613
7-day	1.9	1.3	1.2	2.1	1.7	0.753
30-day	3.6	2.7	2.2	3.5	2.3	0.193
1 year	6.9	6.9	6.8	7.2	4.7	0.042
MACE[1]						
30-day	9.2	9.3	7.9	7.3	9.7	0.695
–Women–						
n	401	432	377	351	359	
Mortality						
In-hospital	2.5	3.5	3.2	4.6	3.9	0.188
7-day	3.2	3.3	2.9	5.1	2.8	0.794
30-day	6.2	7.0	6.1	7.6	3.3	0.172
1 year	12.3	12.9	11.6	15.8	8.1	0.237
MACE[1]						
30-day	14.2	14.1	12.7	13.1	10.3	0.102

[1] 30 day MACE: Death/UAP/MI-isch/CVA/St.thromb/Follow-up urg. revasc

as above
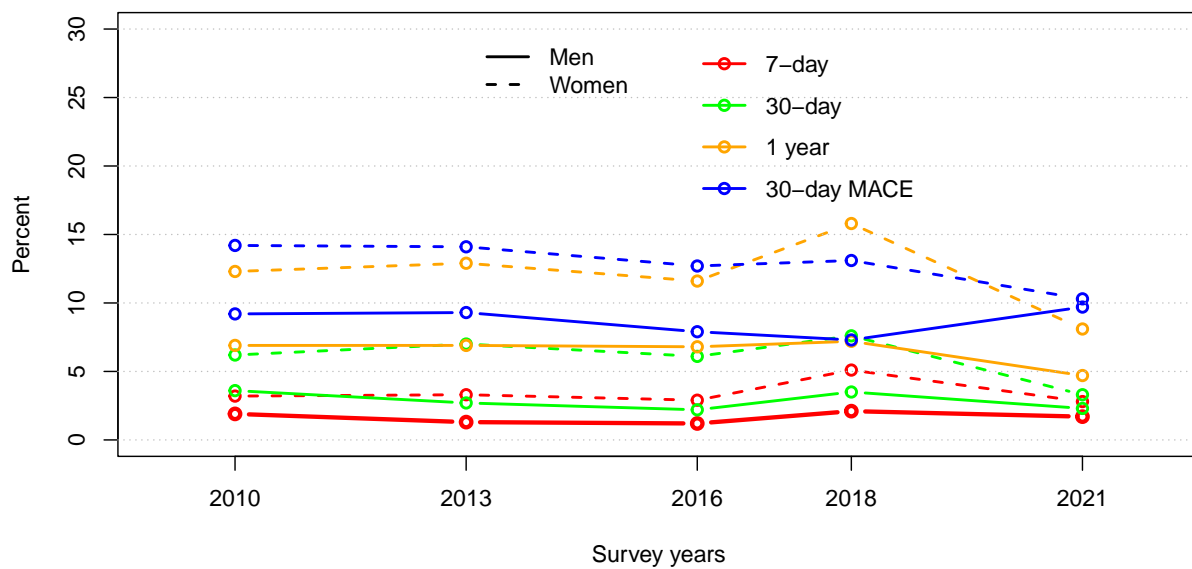
Figure 2.8: Rates of Mortality and 30–day MACE
by gender

Table 2.16: Rates of Mortality and MACE[1] by ECG on Admission

	2010	2013	2016	2018	2021	p for trend
ST elevation						
n	760	727	708	690	700	
Mortality						
In-hospital	3.3	3.3	3.1	3.8	3.3	0.825
7-day	3.6	3.6	3.3	3.6	3.1	0.687
30-day	5.3	5.0	5.0	5.7	4.0	0.463
1 year	8.8	8.7	8.1	10.8	5.6	0.138
MACE[1]						
30-day	11.6	12.2	10.9	9.2	8.7	0.016
Non ST elevation						
n	1019	1158	1083	1088	1050	
Mortality						
In-hospital	1.3	1.1	0.7	2.4	1.5	0.114
7-day	1.2	0.6	0.5	2.1	1.1	0.199
30-day	3.4	2.9	1.8	3.4	1.5	0.034
1 year	7.6	8.0	7.6	7.7	5.3	0.042
MACE[1]						
30-day	9.4	9.2	7.6	8.0	10.6	0.688

[1] 30 day MACE: Death/UAP/MI-isch/CVA/St.thromb/Follow-up urg. revasc

as above

Figure 2.9: Rates of Mortality and 30–day MACE by ECG on Admission