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

Booklet ACSIS 2024

August 2024

Contents

Introduction

We are proud to present you with the ACSIS 2024 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 2024 was carried out during March-April 2024 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 1801 consecutive ACS patients admitted and diagnosed with ACS.

The ACSIS 2024 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 ICCU'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 2024 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 quality indicators for individual centers, has produced numerous scientific papers and allows important analyses of long-term trends in ACS.
The 2024 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 2024 survey was generously supported by an unrestricted grant by the following companies:

Pfizer NOVARTIS AstraZeneca SANOFI novo nordisk BAYER Boehringer Ingelheim MEDISON

Chapter 1: Acute Coronary Syndrome (ACS) in Cardiology

1.1 Distribution of Patients with ACS by Electrocardiogram (ECG) on Admission

Figure 1.1.a: Distribution of Patients with ACS by ECG on Admission

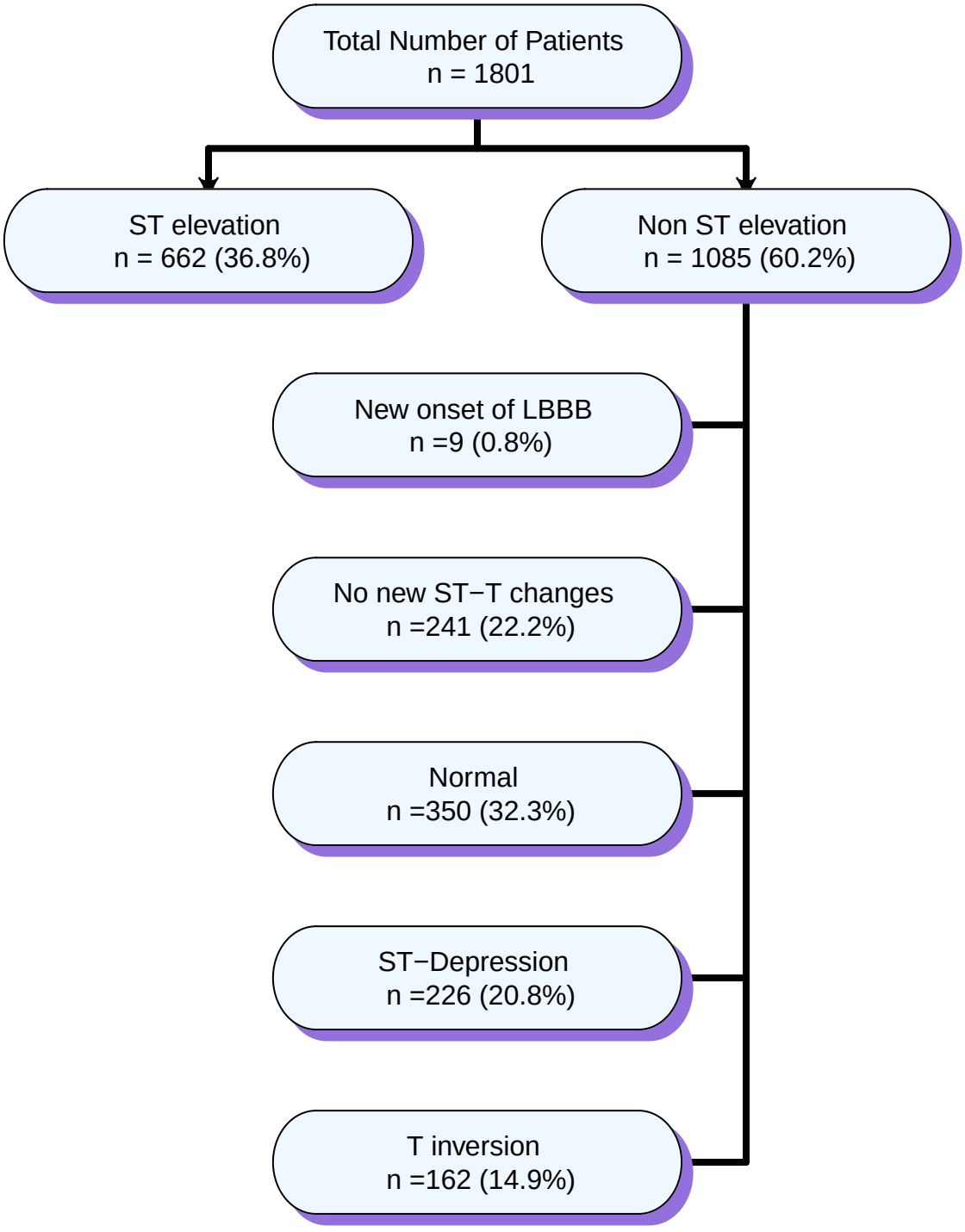


Figure 1.1.b: Distribution of Patients with ACS by Discharge Diagnosis

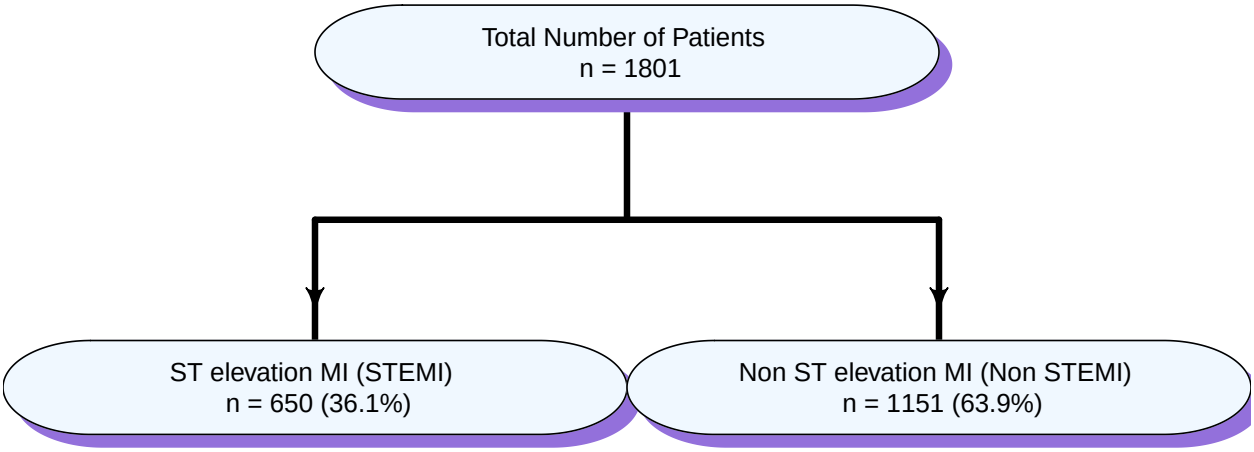
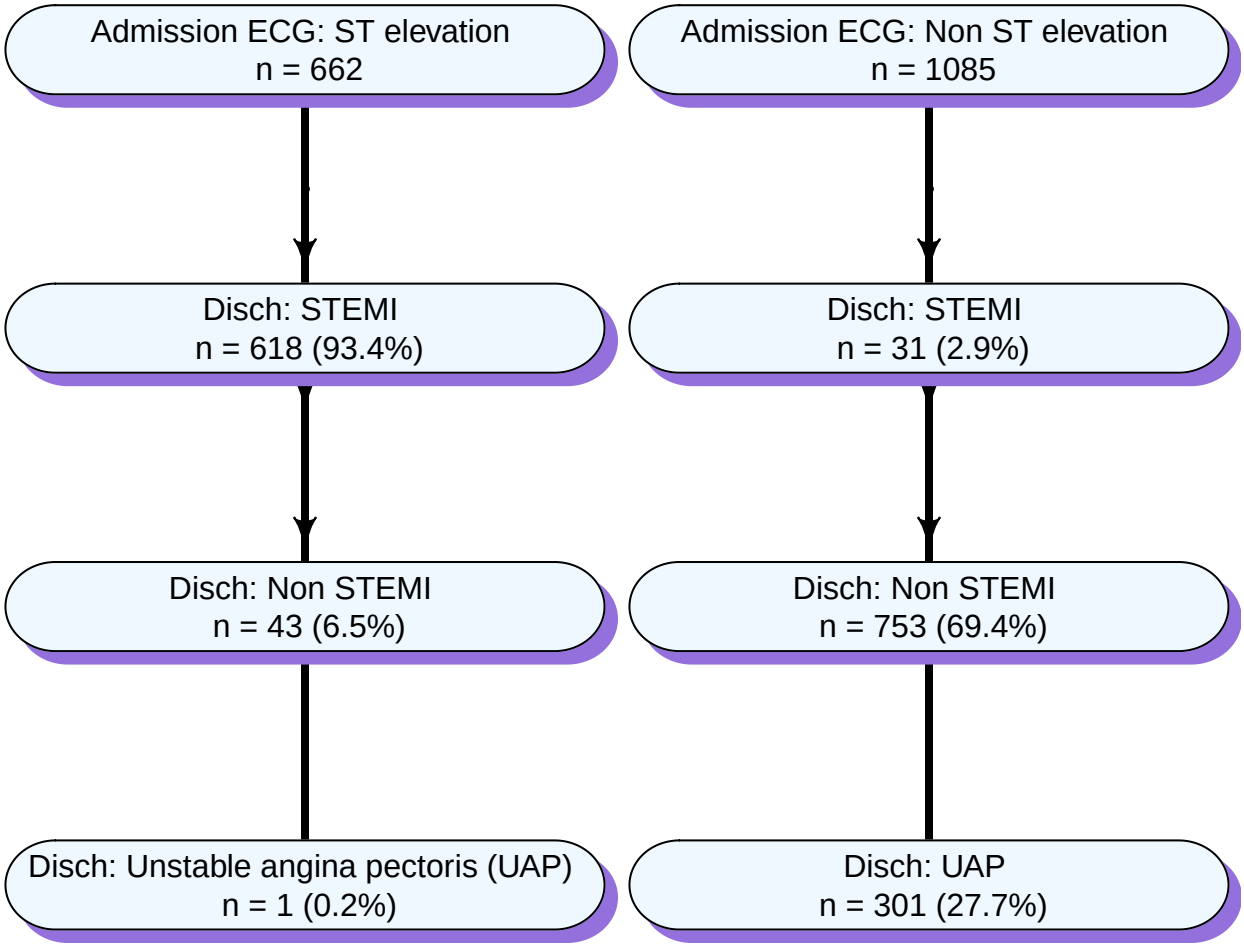


Figure 1.1.c: Admission versus Discharge Diagnosis



1.2 Demographic Characteristics

1.2.1 Age Distribution by ECG on Admission

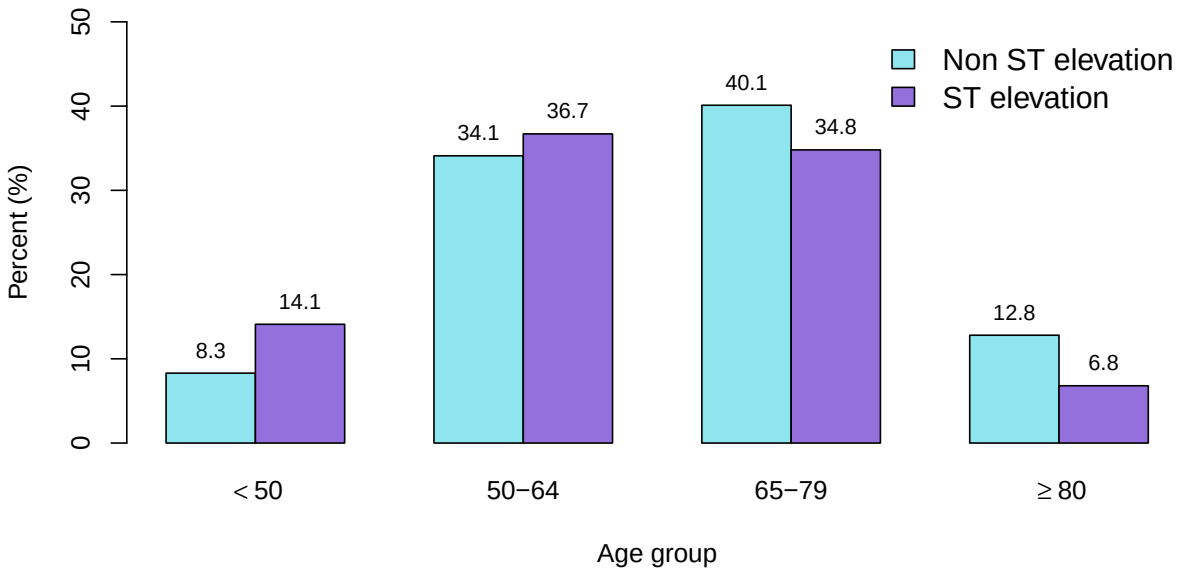
Patients with ST elevation were younger (mean age: 62.7 ± 12.1) than those with non ST elevation (mean age: 66.1 ± 11.9), and the age distribution of patients with ST elevation indicated a greater proportion of younger patients (55% were aged < 65 years) than that of patients with non ST elevation (44.4% aged < 65 years).

Table 1.1: Age Distribution by ECG on Admission

	Total	Non ST elevation	ST elevation	p-value
n	1801	1085	662	
Age groups (%)				<0.001
< 50	206 (11.4)	94 (8.7)	101 (15.3)	
50-64	669 (37.1)	388 (35.8)	263 (39.7)	
65-79	723 (40.1)	457 (42.1)	249 (37.6)	
≥ 80	203 (11.3)	146 (13.5)	49 (7.4)	
Age (mean(sd))	64.75 (12.11)	66.10 (11.86)	62.73 (12.10)	<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

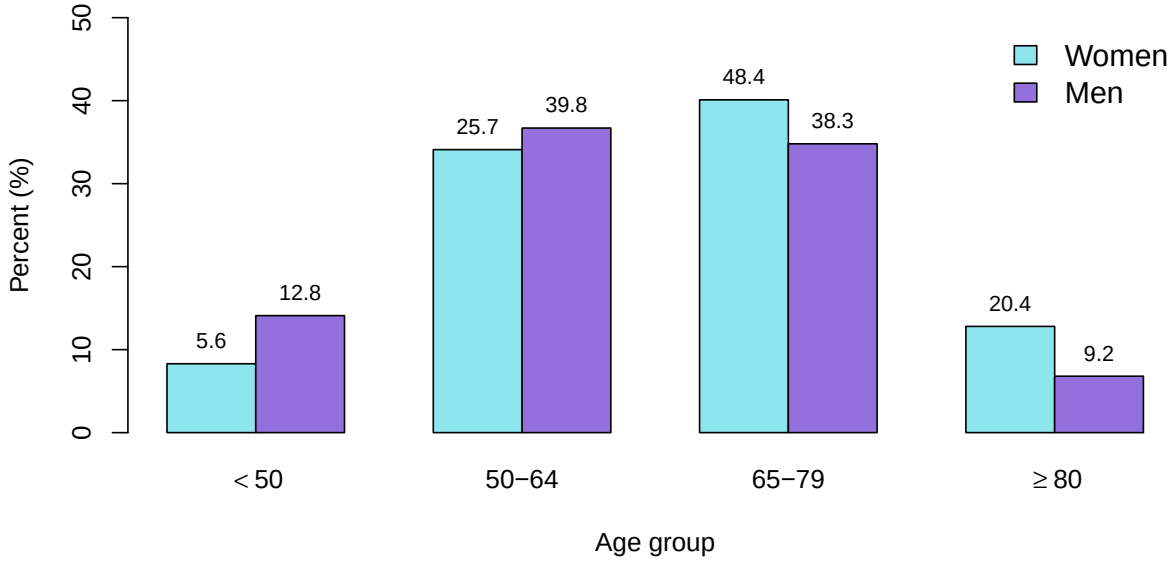
The age distribution of male patients was significantly different from that of female patients. The majority of men (52.6%) were in the younger age groups (< 65) and only 9.2% were aged 80 or above. 12.8% of men were less than 50 years old. By contrast, the majority of the female patients were in the older age groups ≥ 65 (68.7%). The number of women under the age of 50 was significantly lower than of their male counterparts (5.6%), and 20.4% were aged 80 or above.

Table 1.2: Age Distribution by Gender

	Total	Women	Men	p-value
n	1801	339	1461	
Age groups (%)				<0.001
< 50	206 (11.4)	19 (5.6)	187 (12.8)	
50-64	669 (37.1)	87 (25.7)	581 (39.8)	
65-79	723 (40.1)	164 (48.4)	559 (38.3)	
≥ 80	203 (11.3)	69 (20.4)	134 (9.2)	
Age (mean(sd))	64.75 (12.11)	69.87 (11.63)	63.57 (11.91)	<0.001

Percentages are calculated out of available data

Figure 1.3: Age Distribution by Gender



1.2.3 Gender Distribution

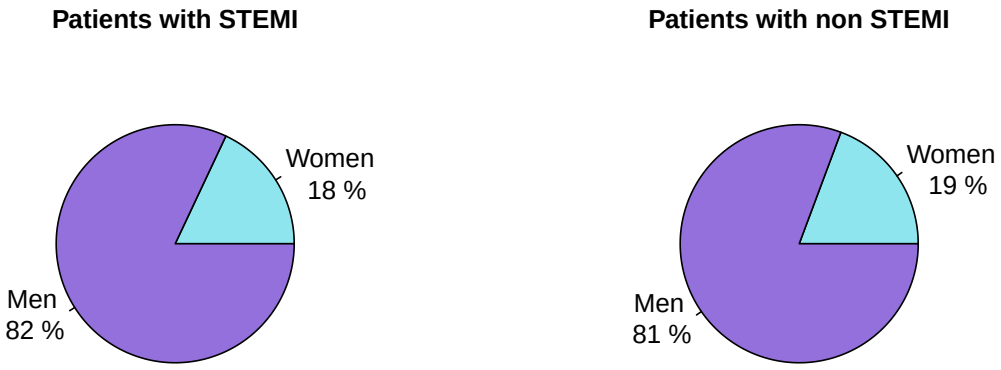
For both STEMI and Non STEMI patients we observed a clear male predominance.

Table 1.3: Gender Distribution

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
Women (%)	339 (18.8)	222 (19.3)	117 (18.0)	0.537
Men (%)	1461 (81.2)	928 (80.7)	533 (82.0)	

Percentages are calculated out of available data

Figure 1.4: Gender Distribution



1.3 Cardiovascular History

1.3.1 Cardiovascular History

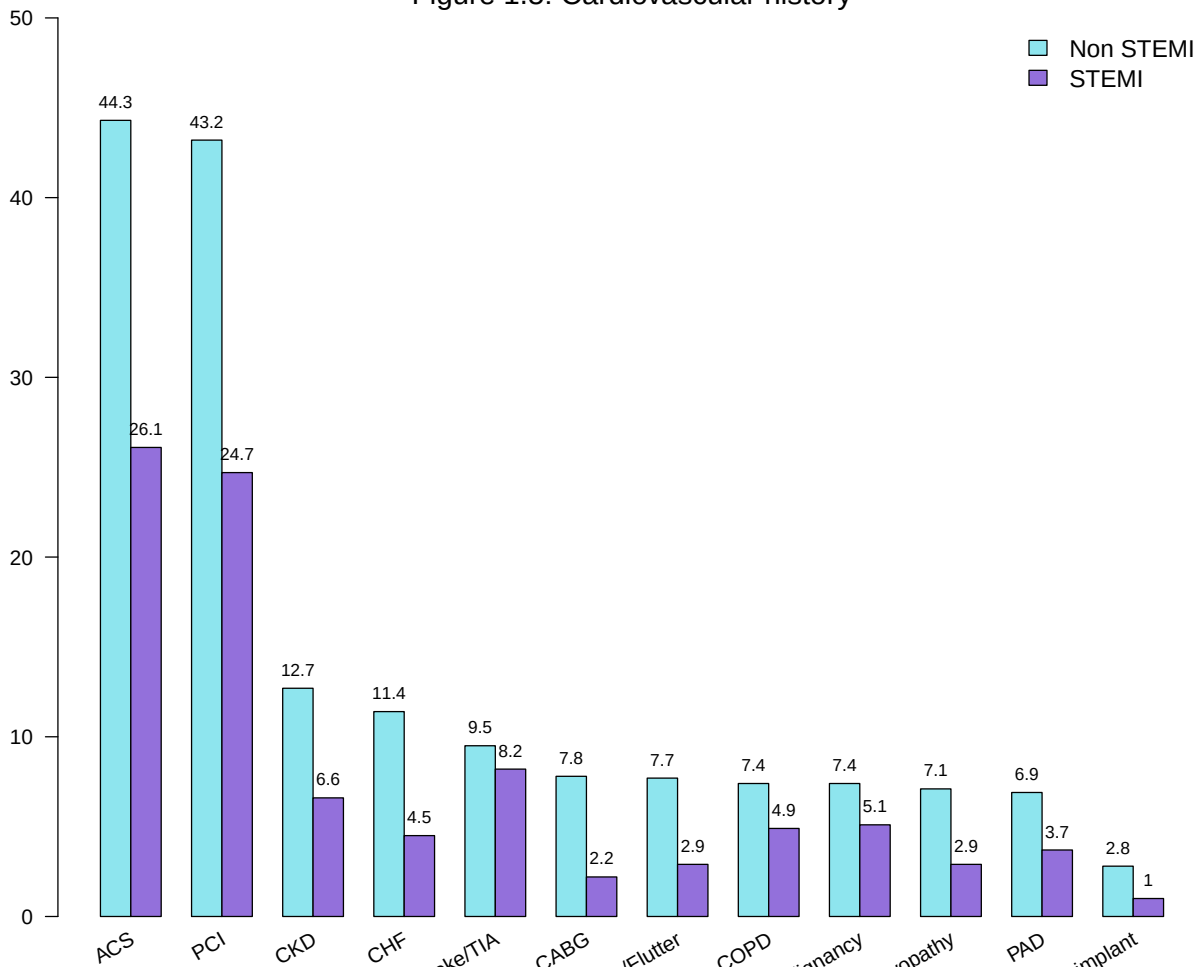
A history of ACS, cardiomyopathy, congestive heart failure (CHF), chronic renal failure, peripheral artery disease (PAD) and atrial fibrillation was significantly more frequent among patients with non STEMI. Similarly, more patients with non STEMI had undergone percutaneous coronary intervention (PCI)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

Table 1.4: Prior Cardiovascular History

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
ACS (%)	655 (37.5)	486 (44.3)	169 (26.1)	<0.001
CABG (%)	100 (5.7)	86 (7.8)	14 (2.2)	<0.001
PCI (%)	636 (36.3)	476 (43.2)	160 (24.7)	<0.001
Cardiomyopathy (%)	97 (5.6)	78 (7.1)	19 (2.9)	<0.001
CHF (%)	154 (8.8)	125 (11.4)	29 (4.5)	<0.001
Chronic Kidney Disease (CKD) (%)	182 (10.4)	139 (12.7)	43 (6.6)	<0.001
PAD (%)	100 (5.8)	76 (6.9)	24 (3.7)	0.008
Stroke/Transient ischemic attack (TIA) (%)	157 (9.0)	104 (9.5)	53 (8.2)	0.401
Chronic Obstructive Pulmonary Disease (COPD) (%)	113 (6.5)	81 (7.4)	32 (4.9)	0.055
Atrial fibrillation/Flutter (%)	104 (5.9)	85 (7.7)	19 (2.9)	<0.001
Implantable cardioverter-defibrillators (ICD)/Cardiac resynchronization therapy (CRT) implant (%)	34 (2.1)	28 (2.8)	6 (1.0)	0.023
Any malignancy (%)	107 (6.6)	75 (7.4)	32 (5.1)	0.087
Thyroid disease (%)	72 (4.4)	52 (5.2)	20 (3.2)	0.089

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

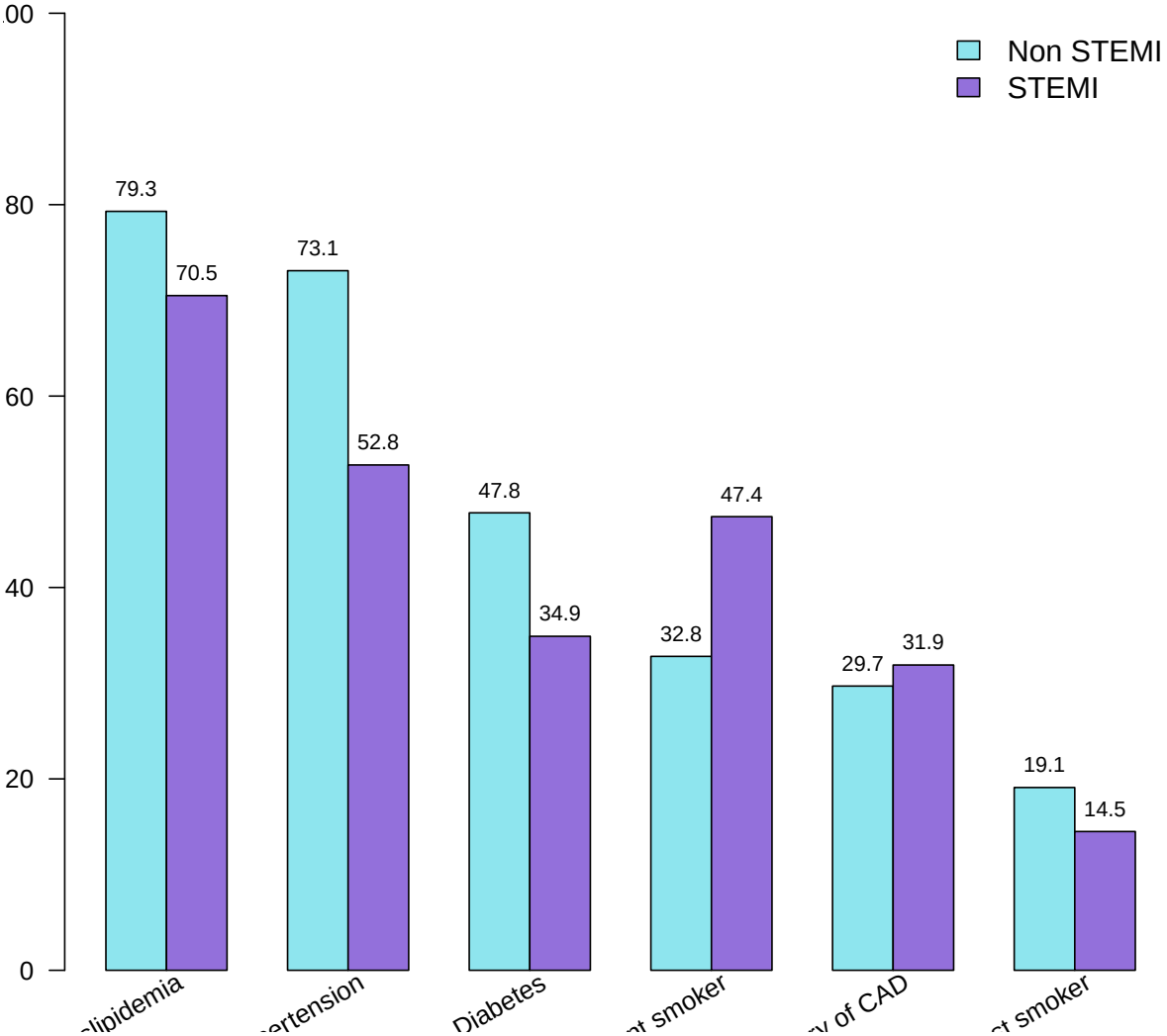
Table 1.5: Risk Factors

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
Hypertension (%)	1144 (65.6)	802 (73.1)	342 (52.8)	<0.001
Diabetes (%)	754 (43.0)	527 (47.8)	227 (34.9)	<0.001
* Newly diagnosed (%)	31 (4.1)	18 (3.4)	13 (5.7)	0.205
Dyslipidemia (%)	1326 (76.0)	870 (79.3)	456 (70.5)	<0.001
Current smoker (%)	686 (38.1)	378 (32.8)	308 (47.4)	<0.001
Past smoker (%)	314 (17.4)	220 (19.1)	94 (14.5)	0.015
Family history of CAD (%)	445 (30.5)	271 (29.7)	174 (31.9)	0.400

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 non STEMI (40.6%) were being treated with aspirin compared to those with STEMI (27.2%). Other drugs in common use were Angiotensin-Converting-Enzyme (ACE) Inhibitors and Angiotensin Receptor Blockers (ARB), Beta Blockers, lipid-lowering drugs (primarily statins) and diuretics all of which were in use more frequently among patients presenting with non STEMI. 7.6% of patients with non STEMI and 2.5% of those with STEMI were being treated with clopidogrel.

Table 1.6: Prior Chronic Treatment

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
Anti-platelets				
Aspirin (%)	644 (35.8)	467 (40.6)	177 (27.2)	<0.001
P2Y12 (%)	163 (9.1)	132 (11.5)	31 (4.8)	<0.001
Clopidogrel (%)	104 (5.8)	88 (7.6)	16 (2.5)	<0.001
Prasugrel (%)	27 (1.5)	19 (1.7)	8 (1.2)	0.615
Ticagrelor (%)	32 (1.8)	25 (2.2)	7 (1.1)	0.133
Anticoagulants				
Oral anticoagulants[1](%)	88 (4.9)	71 (6.2)	17 (2.6)	0.001
Direct oral anticoagulation (DOAC)[2](%)	80 (4.4)	64 (5.6)	16 (2.5)	0.003
Warfarin (%)	9 (0.5)	8 (0.7)	1 (0.2)	0.224
Dabigatran (%)	4 (0.2)	2 (0.2)	2 (0.3)	0.953
Rivaroxaban (%)	14 (0.8)	9 (0.8)	5 (0.8)	1.000
Apixaban (%)	62 (3.4)	53 (4.6)	9 (1.4)	0.001
Other				
ACE-I (%)	331 (18.4)	245 (21.3)	86 (13.2)	<0.001
ARB (%)	244 (13.5)	172 (14.9)	72 (11.1)	0.026
Beta Blockers (%)	445 (24.7)	333 (28.9)	112 (17.2)	<0.001
Calcium channel blockers (CCB) (%)	219 (12.2)	168 (14.6)	51 (7.8)	<0.001
Nitrates (%)	21 (1.2)	20 (1.7)	1 (0.2)	0.005
Diuretics (%)	115 (6.4)	97 (8.4)	18 (2.8)	<0.001
Antihyperglycemic drugs[3] (%)	270 (15.0)	194 (16.9)	76 (11.7)	0.004
Statins[4] (%)	665 (36.9)	476 (41.4)	189 (29.1)	<0.001
Ezetimibe (%)	165 (9.2)	129 (11.2)	36 (5.5)	<0.001

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

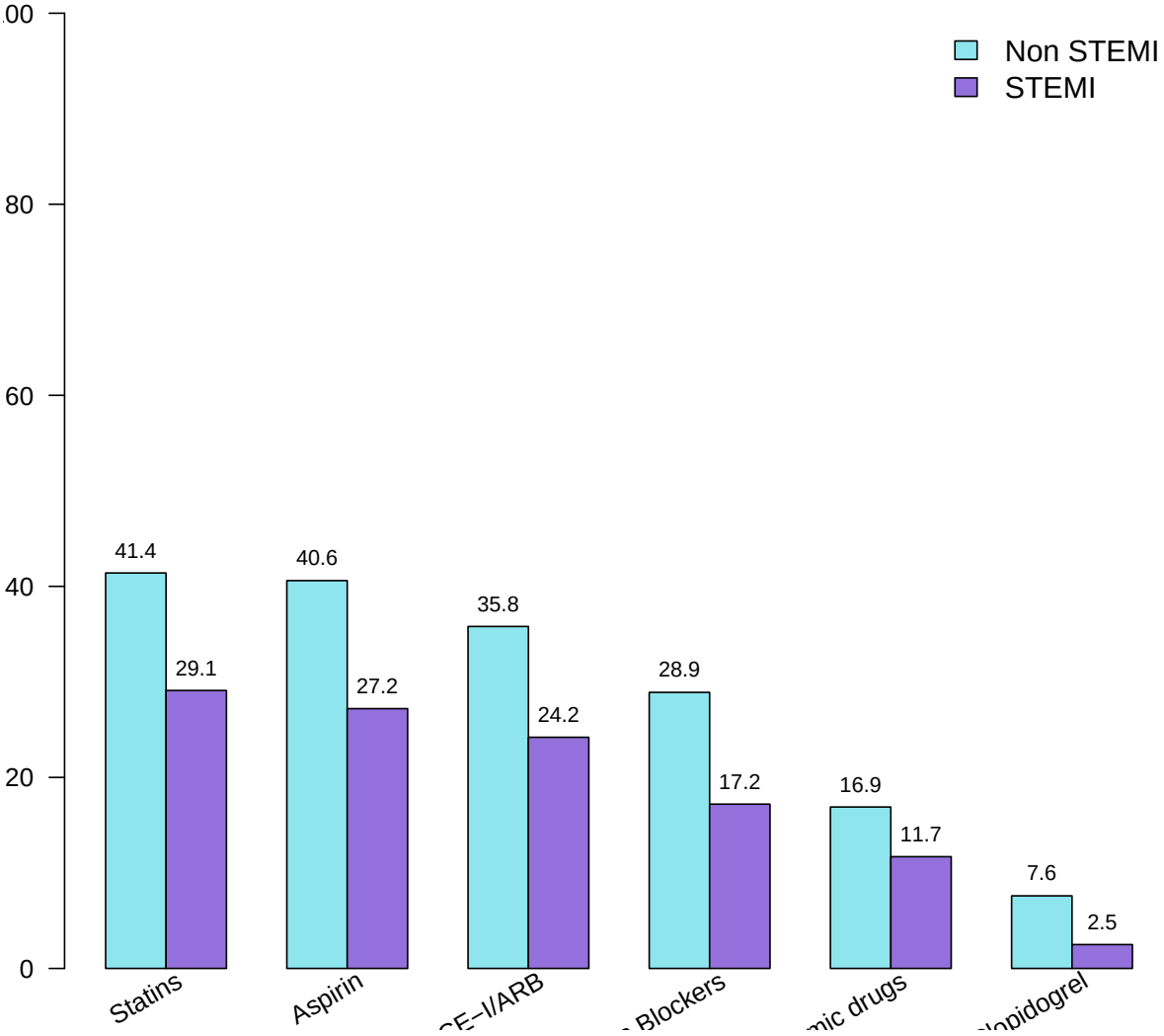
[2] Direct Oral anticoagulants include: Dabigatran, Rivaroxaban, Apixaban

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

[4] 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

41.4% 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.

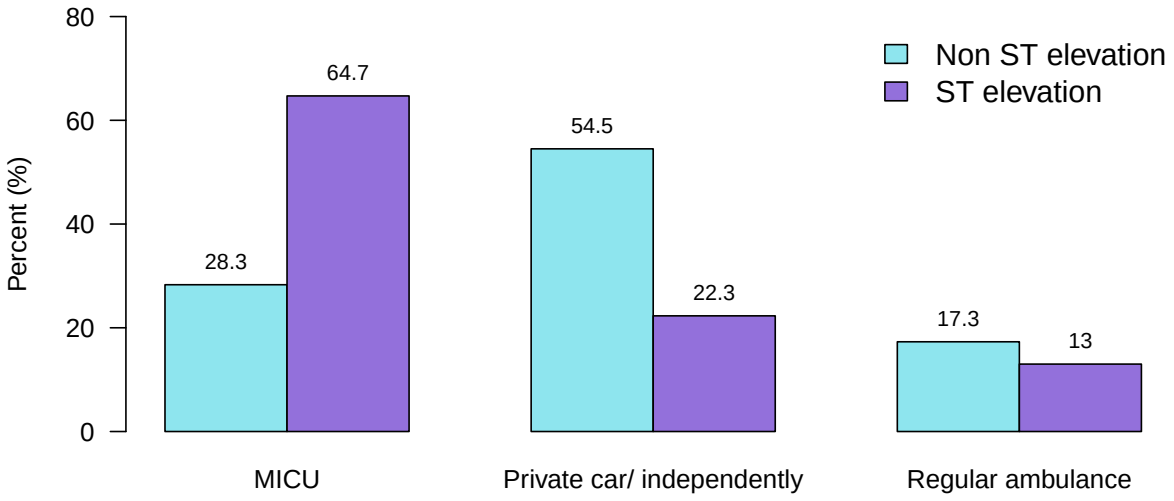
Table 1.7: Mode of Transportation by ECG on Admission

	Total	Non ST elevation	ST elevation
n[1]	1450	863	584
MICU (%)	622 (42.9)	244 (28.3)	378 (64.7)
Private car/ independently (%)	601 (41.4)	470 (54.5)	130 (22.3)
Regular ambulance (%)	227 (15.7)	149 (17.3)	76 (13.0)

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

NA% 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.

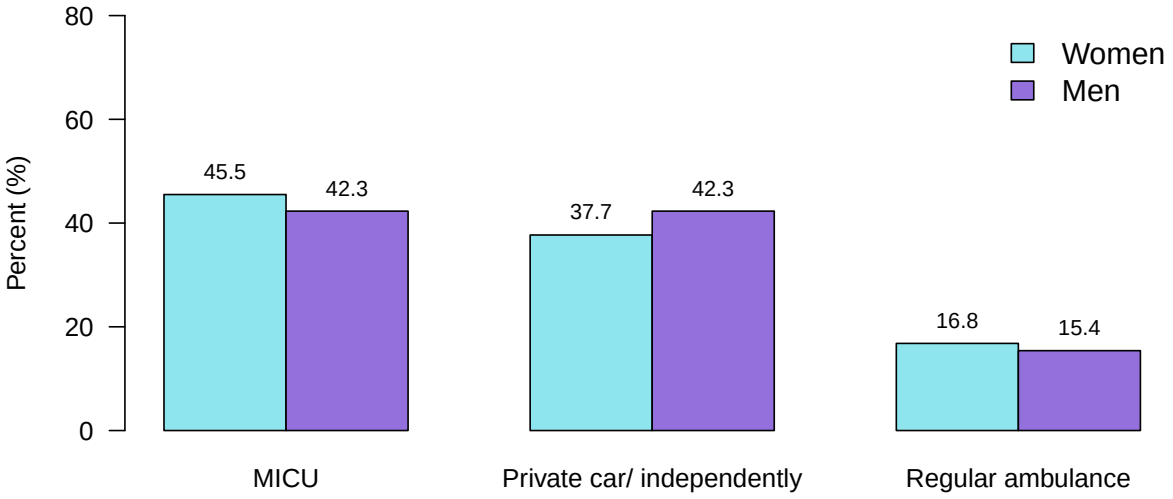
Table 1.8: Mode of Transportation by Gender

	Total	Women	Men
n[1]	1450	268	1181
MICU (%)	622 (42.9)	122 (45.5)	499 (42.3)
Private car/ independently (%)	601 (41.4)	101 (37.7)	500 (42.3)
Regular ambulance (%)	227 (15.7)	45 (16.8)	182 (15.4)

p-value = 0.377

[1] Excluded in-patients

Figure 1.9: Mode of Transportation by gender

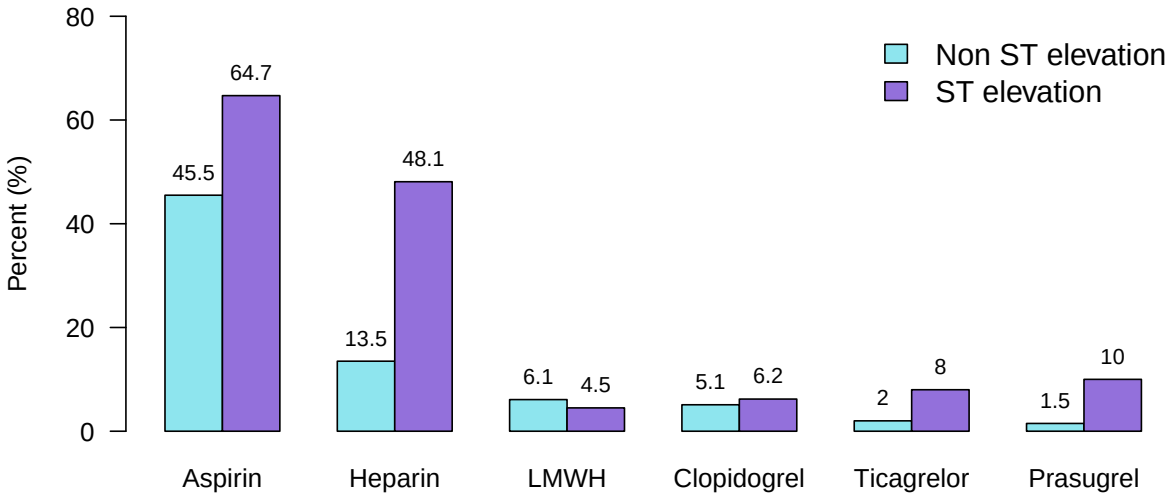


1.5.3 Drugs administered at the Emergency Department (ED)

Table 1.9: Drugs administered at the ED

	Total	Non ST elevation	ST elevation	p-value
n	1801	1085	662	
Aspirin (%)	645 (49.7)	458 (45.5)	187 (64.7)	<0.001
Clopidogrel (%)	69 (5.3)	51 (5.1)	18 (6.2)	0.532
Prasugrel (%)	44 (3.4)	15 (1.5)	29 (10.0)	<0.001
Ticagrelor (%)	43 (3.3)	20 (2.0)	23 (8.0)	<0.001
Heparin (%)	275 (21.2)	136 (13.5)	139 (48.1)	<0.001
Low Molecular Weight Heparin (LMWH) (%)	74 (5.7)	61 (6.1)	13 (4.5)	0.386

Figure 1.10: Drugs administered at the ED



1.5.4 Ward of First Arrival by ECG on Admission

Most patients with ACS present to the ED. However, a higher number of patients with ST elevation presented directly to the intensive cardiac care unit (ICCU) and the catheterization laboratory than those with non ST elevation.

Table 1.10: Ward of First Arrival by ECG on Admission

	Total	Non ST elevation	ST elevation
n	1801	1085	662
Directly to cardiology ward (%)	20 (1.1)	19 (1.8)	0 (0.0)
Directly to cath lab (%)	200 (11.4)	16 (1.5)	183 (27.6)
Directly to ICCU (%)	220 (12.6)	34 (3.1)	186 (28.1)
Directly to internal medicine ward (%)	5 (0.3)	4 (0.4)	1 (0.2)
Patients arrived by MICU			
ED (%)	1297 (74.1)	1006 (92.7)	289 (43.7)
Other (%)	9 (0.5)	6 (0.6)	3 (0.5)
n	622	244	378
Directly to cardiology ward (%)	1 (0.2)	1 (0.4)	0 (0.0)
Directly to cath lab (%)	146 (23.5)	3 (1.2)	143 (37.8)
Directly to ICCU (%)	160 (25.7)	13 (5.3)	147 (38.9)
Directly to internal medicine ward (%)	2 (0.3)	1 (0.4)	1 (0.3)
ED (%)	311 (50.0)	226 (92.6)	85 (22.5)
Other (%)	2 (0.3)	0 (0.0)	2 (0.5)

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

1.5.5 First Ward of Admission

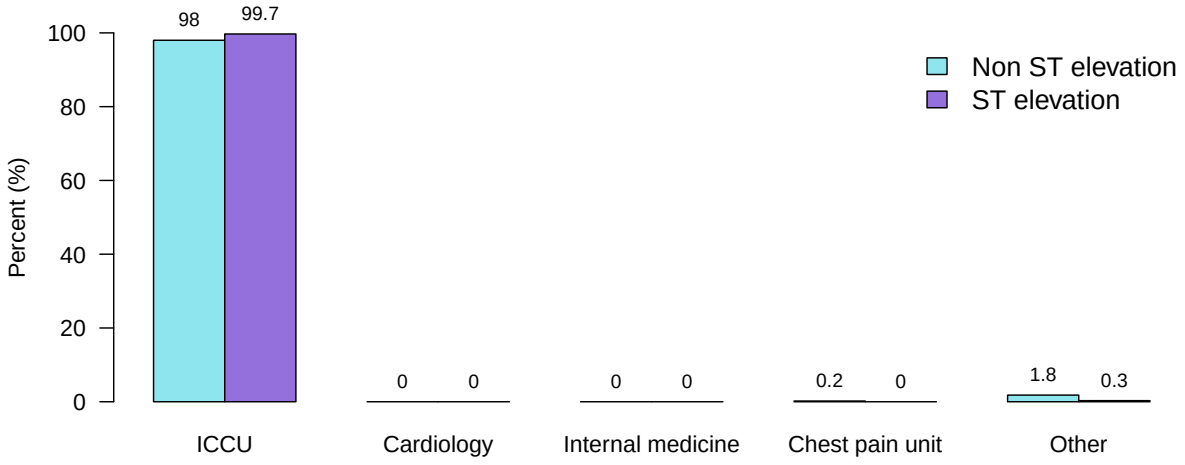
As expected, the majority of patients presenting with ST elevation were hospitalized in the ICCU (95.5%). 46.3% of the patients who presented with non ST elevation were admitted to the ICCU and an additional 40% to a cardiology department, with the remaining 12.8% being admitted to internal medicine departments.

Table 1.11: First Ward of Hospitalization

	Total	Non ST elevation	ST elevation
n	1801	1085	662
ICCU (%)	1136 (99.0)	502 (98.0)	632 (99.7)
Cardiology (%)	0 (0.0)	0 (0.0)	0 (0.0)
Internal medicine (%)	0 (0.0)	0 (0.0)	0 (0.0)
Chest pain unit (%)	1 (0.1)	1 (0.2)	0 (0.0)
Other (%)	11 (1.0)	9 (1.8)	2 (0.3)

Difference in first ward of hospitalization, ST elevation vs. non ST elevation, p NaN

Figure 1.11: First Ward of Hospitalization



1.5.6 Time from Symptom Onset to Hospital Arrival, by ECG on Admission

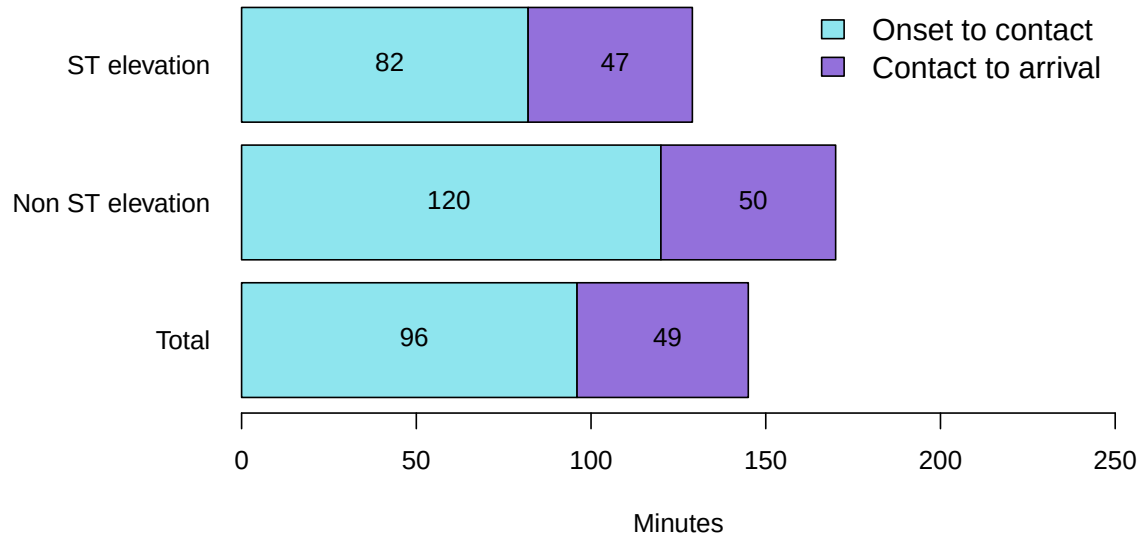
All time frames were significantly shorter for patients with ST elevation. Patients with ST elevation sought help earlier when compared to patients with non ST elevation.

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

	Total	Non ST elevation	ST elevation	p-value
n[1]	1044	499	494	
Onset to first medical contact, minutes (median [IQR])	96.00 [40.00, 290.50]	120.00 [50.00, 489.75]	82.00 [30.00, 192.75]	<0.001
First medical contact to arrival, minutes (median [IQR])	49.00 [32.00, 75.00]	50.00 [34.00, 87.00]	47.00 [31.00, 70.00]	0.015
Onset to arrival, minutes (median [IQR])	153.50 [86.25, 393.75]	205.00 [97.00, 592.00]	138.00 [78.00, 257.00]	<0.001

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

Figure 1.12: Median Length of Time from Symptom Onset to Admission



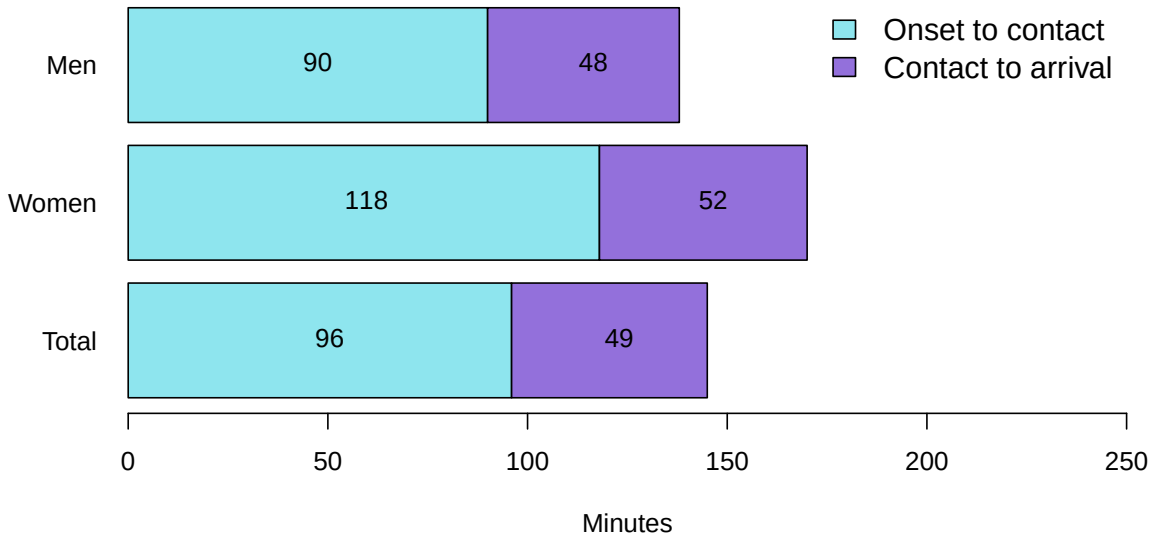
1.5.7 Time from Symptom Onset to Hospital Arrival, by gender

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

	Total	Women	Men	p-value
n[1]	1044	200	843	
Onset to first medical contact, minutes (median [IQR])	96.00 [40.00, 290.50]	118.00 [37.00, 390.00]	90.00 [40.00, 270.00]	0.508
First medical contact to arrival, minutes (median [IQR])	49.00 [32.00, 75.00]	52.00 [37.50, 72.50]	48.00 [31.00, 76.25]	0.256
Onset to arrival, minutes (median [IQR])	153.50 [86.25, 393.75]	174.00 [89.00, 422.50]	148.00 [86.50, 376.50]	0.348

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

Figure 1.13: Median Length of Time from Symptom Onset to Admission



1.5.8 First Medical Contact

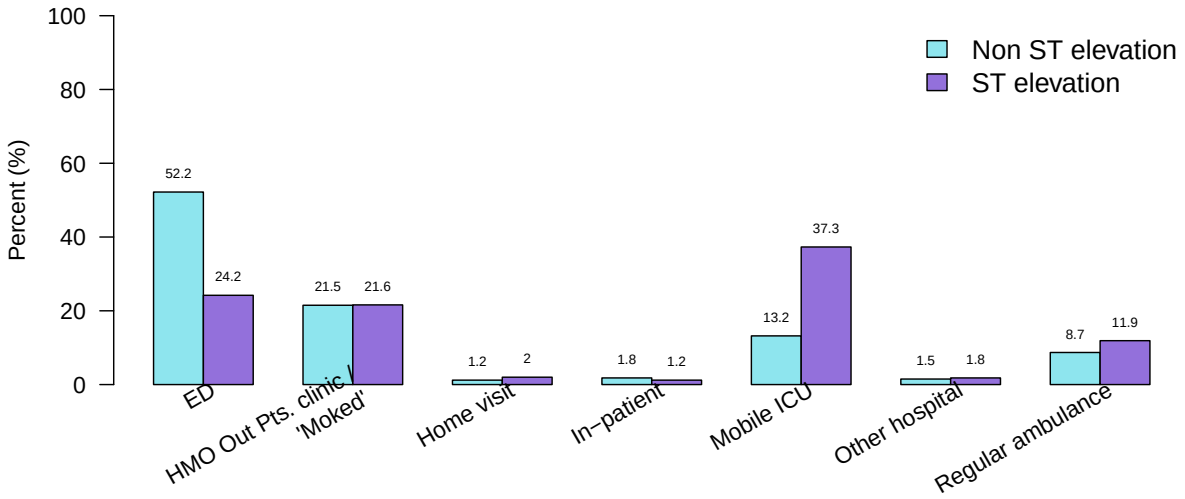
41.6% of patients had the first medical contact at the ED and about 21.5% at a Health maintenance organization (HMO) primary clinic/"Moked". For an additional 22.3% the primary medical contact was with MICU. Patients with ST elevation were more likely to have their first medical contact with a MICU (40% than those with non ST elevation (13.2%).

Table 1.14: First Medical Contact

	Total	Non ST elevation	ST elevation
n	1801	1085	662
ED (%)	728 (41.6)	566 (52.2)	160 (24.2)
HMO Out Pts. clinic / 'Moked' (%)	377 (21.5)	233 (21.5)	143 (21.6)
Home visit (%)	26 (1.5)	13 (1.2)	13 (2.0)
In-patient (%)	29 (1.7)	20 (1.8)	8 (1.2)
Mobile ICU (%)	390 (22.3)	143 (13.2)	247 (37.3)
Other hospital (%)	28 (1.6)	16 (1.5)	12 (1.8)
Regular ambulance (%)	173 (9.9)	94 (8.7)	79 (11.9)

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

Figure 1.14: First Medical Contact



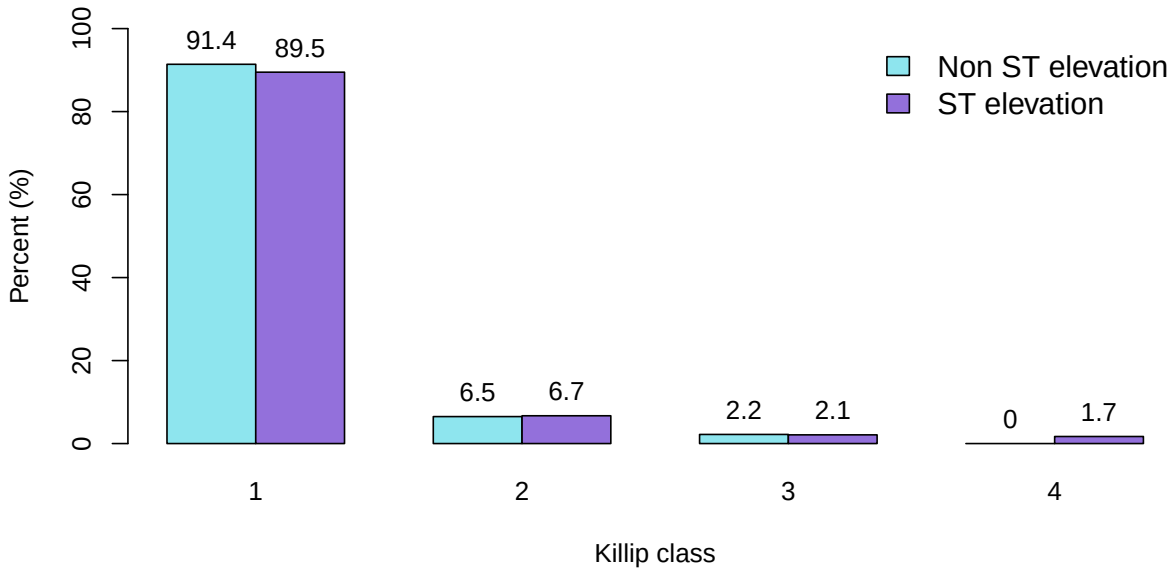
1.5.9 Presenting Symptoms and Killip Class

Typical angina was significantly more frequent in patients presenting with ST elevation (82%) than those presenting with non ST elevation (69%). However, atypical chest pain was more common in patients presenting with non ST elevation (11.1%) than in those with ST elevation (8%). Also dyspnea was more common in patients with non ST elevation (21.8%) than those with ST elevation (14.7%).

Table 1.15: Presenting Symptoms at First Medical Contact

	Total	Non ST elevation	ST elevation	p-value
n	1801	1085	662	
Typical angina (%)	1296 (72.0)	749 (69.0)	543 (82.0)	<0.001
Atypical chest pain (%)	173 (9.6)	120 (11.1)	53 (8.0)	0.047
Syncope (%)	39 (2.2)	22 (2.0)	17 (2.6)	0.566
Aborted Sudden Cardiac Death (SCD) (%)	10 (0.6)	3 (0.3)	7 (1.1)	0.076
Palpitations (%)	30 (1.7)	23 (2.1)	6 (0.9)	0.083
Dyspnea (%)	336 (18.7)	237 (21.8)	97 (14.7)	<0.001
Abdominal pain (%)	84 (4.7)	46 (4.2)	38 (5.7)	0.191

Figure 1.15: Killip Class on Admission



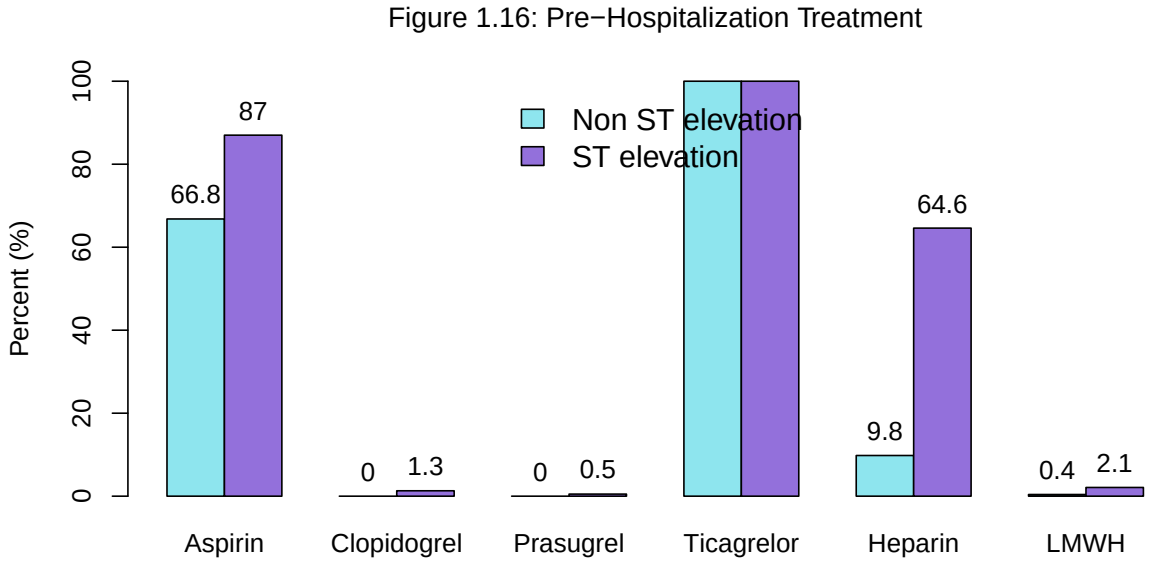
1.5.10 Pre-Hospital Treatment (before ED arrival)

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]	849	393	454	
Aspirin (%)	492 (79.1)	163 (66.8)	329 (87.0)	<0.001
Clopidogrel (%)	5 (0.8)	0 (0.0)	5 (1.3)	0.179
Prasugrel (%)	2 (0.3)	0 (0.0)	2 (0.5)	0.680
Ticagrelor (%)	622 (100.0)	244 (100.0)	378 (100.0)	NA
Heparin (%)	268 (43.1)	24 (9.8)	244 (64.6)	<0.001
LMWH (%)	9 (1.4)	1 (0.4)	8 (2.1)	0.163

[1] Only MICU and regular ambulance patients were included

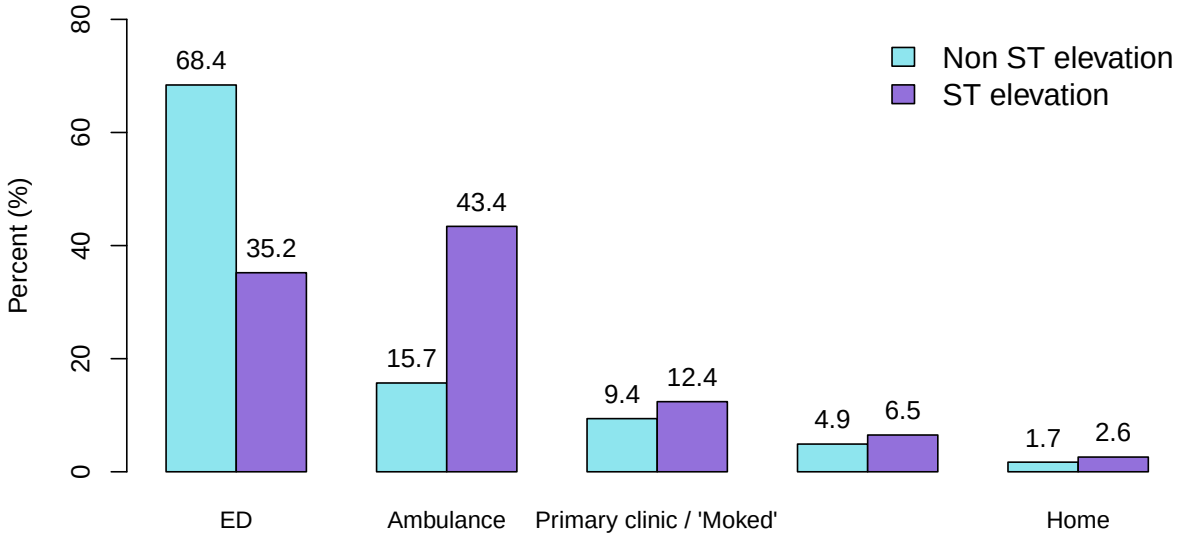


1.6 First Recorded ECG

1.6.1 Location of First ECG Recording

68.4% of patients presenting with non ST elevation and 35.2% 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 17.4% 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 94% of patients presented with a normal sinus rhythm (NSR). 3.1% of patients with ST elevation and 3.9% of those without ST elevation, presented with atrial fibrillation.

Table 1.17: First ECG Rhythm

	Total	Non ST elevation	ST elevation
n	1801	1085	662
NSR (%)	1537 (93.7)	970 (94.4)	565 (92.3)
Atrial fibrillation (%)	59 (3.6)	40 (3.9)	19 (3.1)
Ventricular Tachycardia (VT)/ Ventricular Fibrillation (VF) (%)	21 (1.3)	7 (0.7)	14 (2.3)
High degree (2nd / 3rd) Atrioventricular (AV) Block (%)	14 (0.9)	5 (0.5)	9 (1.5)
Asystole (%)	1 (0.1)	0 (0.0)	1 (0.2)
Other (%)	9 (0.5)	5 (0.5)	4 (0.7)

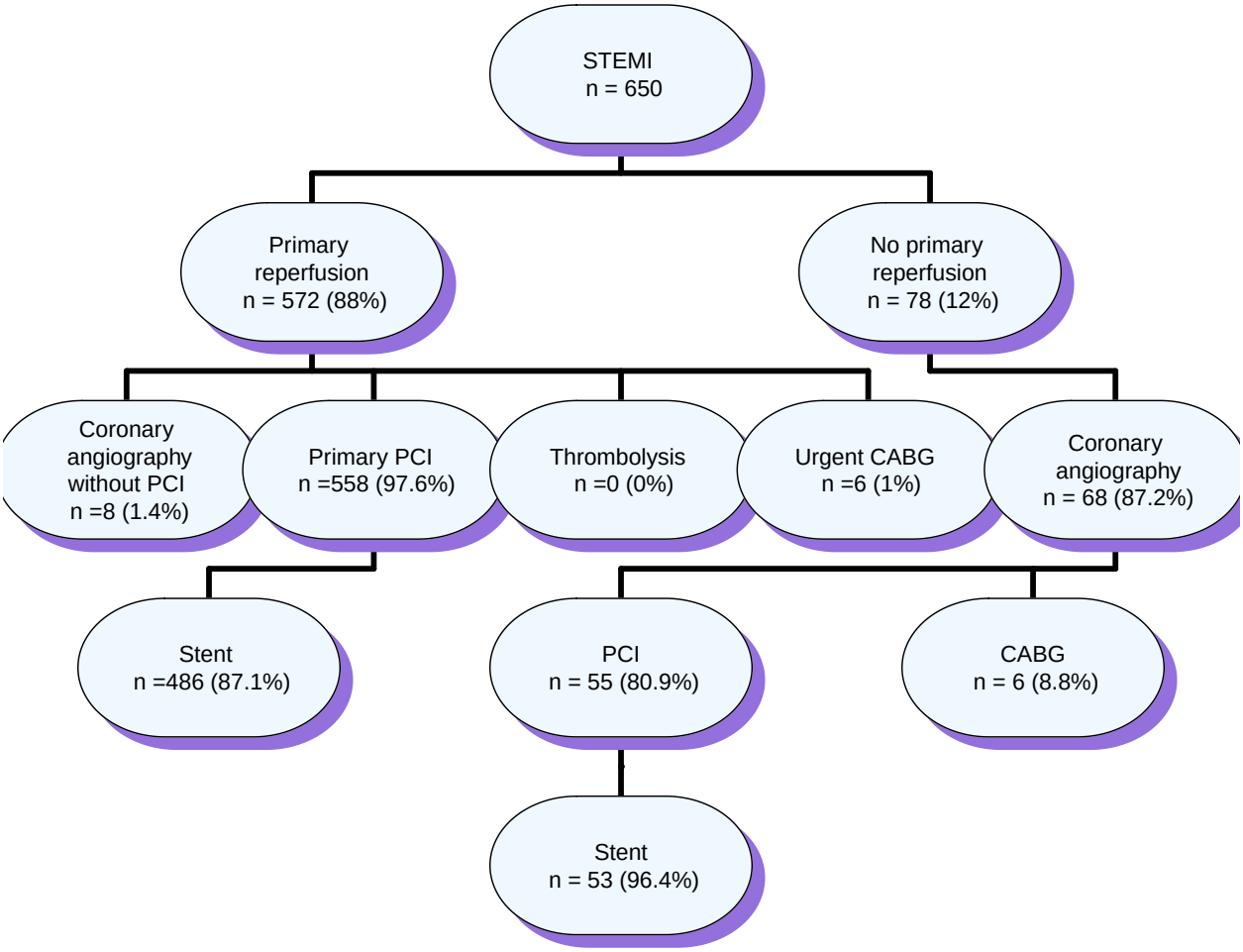
Difference in first ECG rhythm, ST elevation vs. non ST elevation, p 0.011

1.7 Primary Reperfusion

1.7.1 Primary Reperfusion Therapy in Patients with STEMI

88% of patients with STEMI underwent primary reperfusion within 12 hours from onset of symptoms, mainly primary PCI. In 87.1% of these cases, stents were deployed. Of the remaining 12‘% which did not undergo primary reperfusion, 87.2% eventually underwent coronary angiography. Of these, 90% underwent revascularization.

Figure 1.18: Primary Reperfusion in Patients with ST Elevation

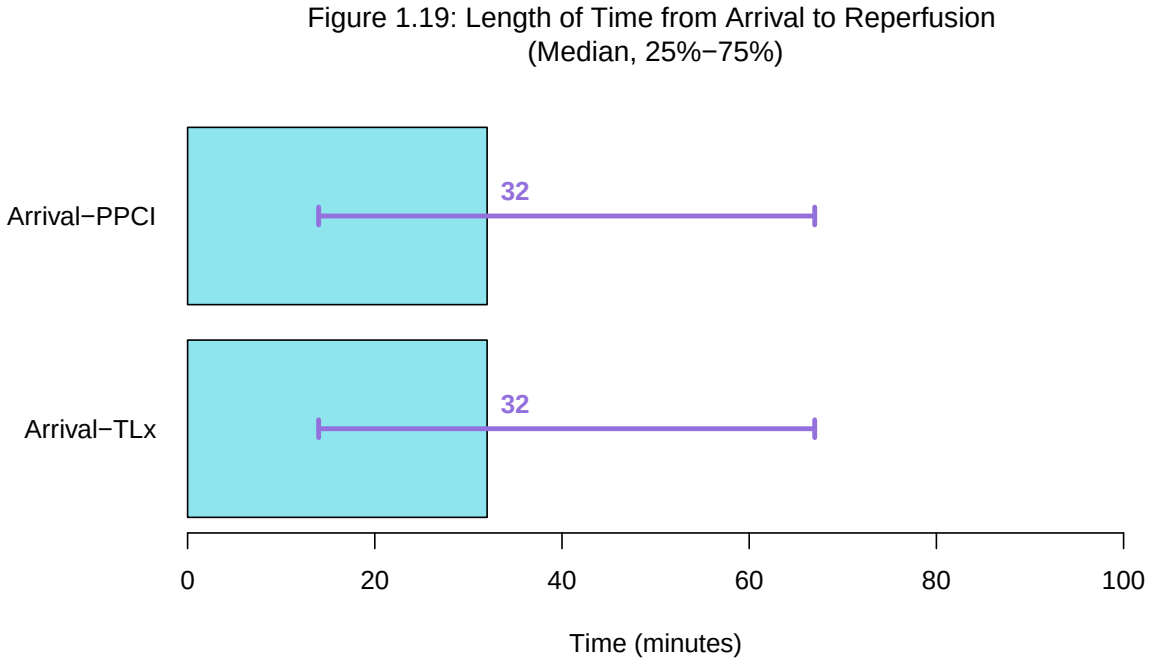


1.7.2 Length of Time from Arrival to Primary Reperfusion

The median time from arrival to primary reperfusion was less than one hour (32 minutes).

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

	N	Time in minutes (median [IQR])
From arrival to thrombolysis (TLx)	0	32.00 [14.00, 67.00]
From arrival to primary PCI (PPCI)	473	32.00 [14.00, 67.00]



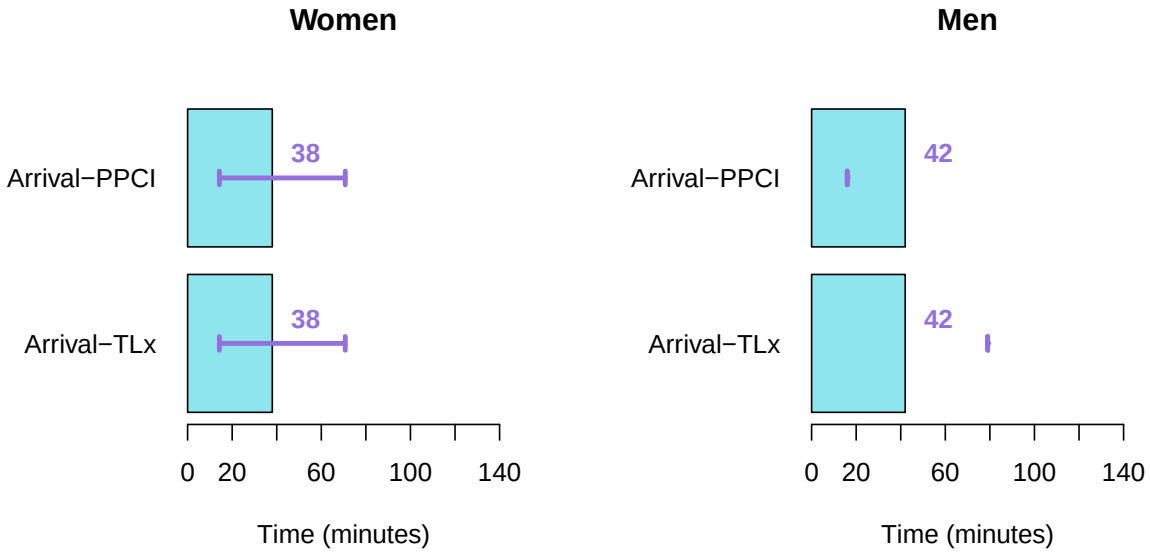
1.7.3 Length of Time from Arrival to Primary Reperfusion, by Gender

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	38 [14.25, 70.75]	0	42 [16 , 79]	0	0.472
From arrival to primary PCI	38 [14.25, 70.75]	90	42 [16 , 79]	441	0.472

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	572
IIb/IIIa antagonists (%)	142 (24.8)
Bivalirudin (%)	13 (2.3)
Aspiration device (%)	43 (7.5)

1.7.5 Primary PCI / Coronary Angiography

Table 1.21: Vascular access during Primary Reperfusion

	Overall
n	572
Vascular access	
Femoral	45 (8.2)
Radial	497 (91.0)
Both	4 (0.7)

1.7.6 Thrombolysis in Myocardial Infarction (TIMI) Grade Flow of Infarct-Related Artery (IRA) During Primary PCI

In 61% 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%).

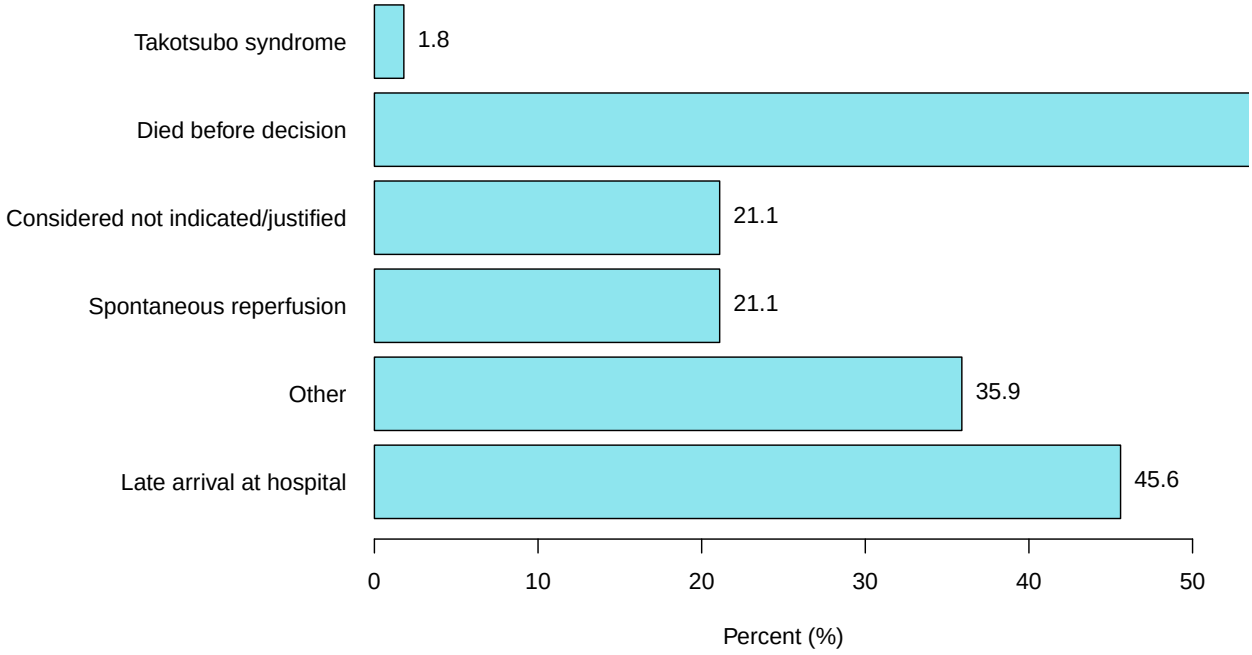
Table 1.22: TIMI Grade Flow of IRA Before and After Revascularization

	Before revascularization (%)	After revascularization (%)
n	480	531
0	293 (61.0)	10 (1.9)
1	71 (14.8)	3 (0.6)
2	53 (11.0)	24 (4.5)
3	63 (13.1)	494 (93.0)

1.7.7 Reasons for Not Performing Primary Reperfusion

12% of patients presenting with STEMI did not receive primary reperfusion therapy. In 21.1% the reason was spontaneous reperfusion, in 45.6% the reason was late arrival at the hospital, and in 21.1% of cases primary reperfusion was considered not indicated.

Figure 1.21: Reasons for Not Performing Primary Reperfusion
Number of Patients = 78



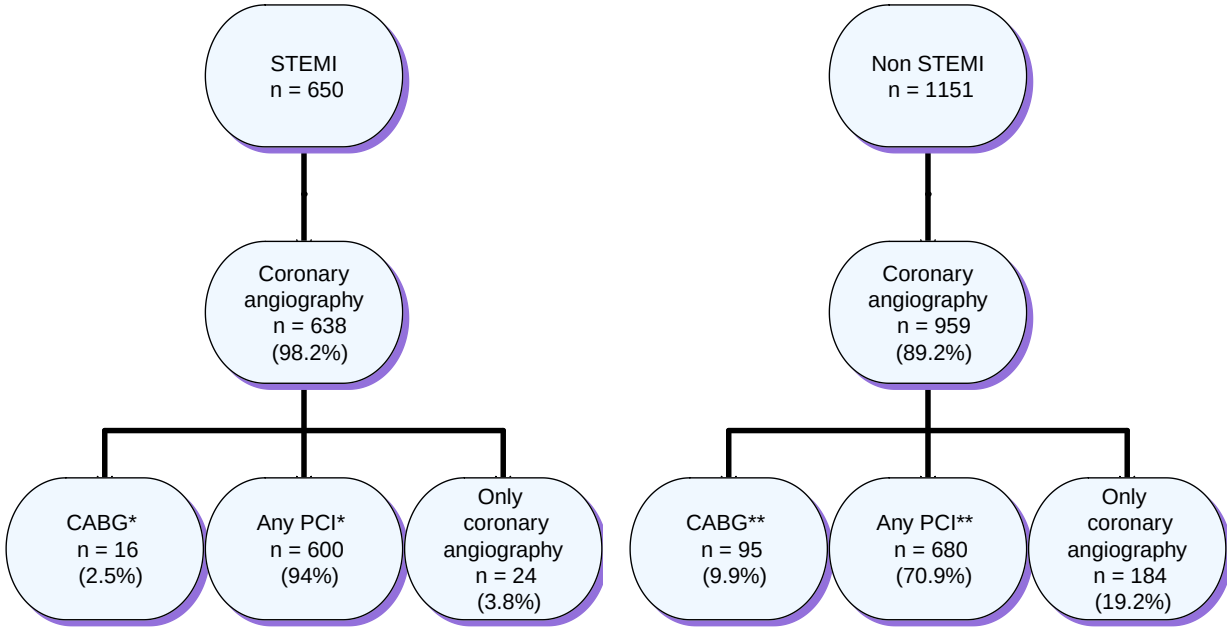
- There were no patients with contraindication to thrombolysis or patient refusal.

1.8 Coronary Interventions and Procedures during Hospitalization

1.8.1 Coronary Angiography and Interventions

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

Figure 1.22: In−Hospital Cardiac Interventions and Procedures



*2 patients underwent both CABG and PCI;
** 2 patients underwent both CABG and PCI.

1.8.2 Coronary Angiography (*excluding primary PCI*)

Table 1.23: Vascular access during coronary angiography

	Overall
n	1201
Coronary angiography	1030 (89.6)
Vascular access:	
Femoral	50 (5.0)
Radial	935 (94.3)
Both	6 (0.6)

1.8.3 Other Procedures During Hospitalization

Patients with STEMI were more likely to receive Direct-Current (DC) shocks, resuscitation and therapeutic hypothermia than those with non STEMI.

Table 1.24: Other Procedures

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
DC shock (%)	54 (3.1)	18 (1.6)	36 (5.6)	<0.001
Resuscitation (%)	39 (2.2)	13 (1.2)	26 (4.0)	<0.001
Mechanical ventilation (%)				0.016
Invasive	48 (2.8)	21 (1.9)	27 (4.2)	
Non invasive	41 (2.4)	24 (2.2)	17 (2.6)	
Intra-Aortic Balloon Pump (IABP) (%)	18 (1.1)	4 (0.4)	14 (2.3)	0.001
Dialysis (%)	9 (0.5)	8 (0.7)	1 (0.2)	0.204
ICD/CRT (%)	13 (0.7)	8 (0.7)	5 (0.8)	1.000
Permanent pacemaker (%)	10 (0.6)	8 (0.7)	2 (0.3)	0.424
Temporary pacemaker (%)	14 (0.8)	3 (0.3)	11 (1.7)	0.003
Temperature control (%)	3 (0.2)	0 (0.0)	3 (0.5)	0.096

1.9 Ejection Fraction

Ejection fraction (EF) was determined in 98.6% of patients with STEMI and in 91.2% of those with non STEMI. EF was normal in a larger proportion of patients with non STEMI (50.7%) than in patients with STEMI (20.7%). 29.9% of patients with STEMI and 15.1% of patients with non STEMI presented with an EF $< 40\%$.

Table 1.25: Ejection Fraction

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
EF determined (%)	1568 (93.9)	948 (91.2)	620 (98.6)	<0.001
EF (range) (%)				<0.001
Normal (55-65%)	608 (38.9)	480 (50.7)	128 (20.7)	
Preserved (50-54%)	192 (12.3)	114 (12.0)	78 (12.6)	
Mild (40-49%)	436 (27.9)	210 (22.2)	226 (36.6)	
Moderate (30-39%)	236 (15.1)	100 (10.6)	136 (22.0)	
Severe (< 30%)	92 (5.9)	43 (4.5)	49 (7.9)	

Note:

EF range percentages are calculated out of patients who had documented EF

1.10 In-Hospital Complications

Cardiogenic shock, CHF mild-moderate, hemodynamically significant Right Ventricular (RV) infarction, ventricular fibrillation (VF), new Atrial fibrillation (AF) and high degree (2nd / 3rd) Atrioventricular Block (AVB) were more frequent in patients with STEMI.

Table 1.26: In-Hospital Complications

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
CHF mild-moderate (Killip-2) (%)	179 (10.3)	90 (8.2)	89 (13.8)	<0.001
Pulmonary edema (Killip-3) (%)	59 (3.4)	33 (3.0)	26 (4.0)	0.326
Cardiogenic shock (Killip-4) (%)	41 (2.4)	11 (1.0)	30 (4.6)	<0.001
Hemodynamically significant RV infarction (%)	7 (0.4)	3 (0.3)	4 (0.6)	0.481
Re-MI (%)	10 (0.6)	7 (0.6)	3 (0.5)	0.890
Post MI angina/re-ischemia (%)	19 (1.1)	13 (1.2)	6 (0.9)	0.791
Stent thrombosis (definite/probable/possible) (%)	11 (0.6)	3 (0.3)	8 (1.2)	0.033
Free wall rupture (%)	3 (0.2)	1 (0.1)	2 (0.3)	0.645
Tamponade (%)	1 (0.1)	1 (0.1)	0 (0.0)	1.000
MR Moderate-severe (%)	25 (1.4)	11 (1.0)	14 (2.2)	0.079
Pericarditis (%)	12 (0.7)	5 (0.5)	7 (1.1)	0.222
Sustained VT (>125 bpm) (%)	16 (0.9)	8 (0.7)	8 (1.2)	0.418
VF (%)	33 (1.9)	7 (0.6)	26 (4.0)	<0.001
New AF (%)	57 (3.3)	35 (3.2)	22 (3.4)	0.932
High degree (2nd / 3rd) AVB (%)	22 (1.3)	10 (0.9)	12 (1.8)	0.140
Asystole (%)	13 (0.7)	7 (0.6)	6 (0.9)	0.700
TIA (%)	4 (0.2)	3 (0.3)	1 (0.2)	1.000
Stroke (%)	5 (0.3)	2 (0.2)	3 (0.5)	0.551
CVA/TIA in hospital (%)	9 (0.5)	5 (0.4)	4 (0.6)	0.861
Acute renal injury (%)	71 (4.3)	46 (4.5)	25 (4.0)	0.707
Sepsis (%)	24 (1.5)	13 (1.3)	11 (1.8)	0.566
Bleeding (%)	11 (0.7)	7 (0.7)	4 (0.6)	1.000
Minor bleeding (%)	9 (0.6)	5 (0.5)	4 (0.6)	0.965
Blood transfusions (%)	6 (0.4)	5 (0.5)	1 (0.2)	0.506

1.11 In-Hospital Medical Treatment

Aspirin, prasugrel, P2Y12 inhibitors, ACE-I/ARB, Spironolactone, beta-blockers, Proton-Pump Inhibitors (PPI), IV inotropic agent and statins were more frequently used in patients with STEMI. Clopidogrel, CCB and nitrates were more frequently used among patients with non STEMI.

All other recommended drugs were similarly given to both groups.

Table 1.27: In-Hospital Medical Treatment

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
Anti-platelets				
Aspirin (%)	1384 (76.8)	840 (73.0)	544 (83.7)	<0.001
P2Y12 inhibitors (%)	1212 (67.3)	692 (60.1)	520 (80.0)	<0.001
Clopidogrel (%)	386 (21.4)	297 (25.8)	89 (13.7)	<0.001
Prasugrel (%)	479 (26.6)	184 (16.0)	295 (45.4)	<0.001
Ticagrelor (%)	380 (21.1)	224 (19.5)	156 (24.0)	0.027
Anticoagulants				
Oral anticoagulants[1] (%)	107 (5.9)	57 (5.0)	50 (7.7)	0.024
Warfarin (%)	22 (1.2)	12 (1.0)	10 (1.5)	0.486
Dabigatran (%)	1801 (100.0)	1151 (100.0)	650 (100.0)	NA
Rivaroxaban (%)	9 (0.5)	4 (0.3)	5 (0.8)	0.384
Apixaban (%)	80 (4.4)	44 (3.8)	36 (5.5)	0.115
Other				
ACE-I (%)	836 (76.7)	699 (74.6)	137 (89.5)	<0.001
ARB (%)	34 (3.1)	31 (3.3)	3 (1.9)	0.527
Spironolactone (%)	214 (11.9)	137 (11.9)	77 (11.8)	1.000
Beta Blockers (%)	766 (42.5)	404 (35.1)	362 (55.7)	<0.001
Digoxin (%)	223 (12.4)	99 (8.6)	124 (19.1)	<0.001
CCB (%)	777 (43.1)	408 (35.4)	369 (56.8)	<0.001
Amiodarone (%)	5 (0.3)	2 (0.2)	3 (0.5)	0.517
Other Anti-Arrhythmic (%)	143 (7.9)	100 (8.7)	43 (6.6)	0.141
Nitrates (%)	51 (2.8)	28 (2.4)	23 (3.5)	0.226
Diuretics (%)	6 (0.3)	2 (0.2)	4 (0.6)	0.256
Proton-Pump Inhibitors (PPI) (%)	78 (4.3)	55 (4.8)	23 (3.5)	0.262
H2 Blockers (%)	184 (10.2)	116 (10.1)	68 (10.5)	0.860
NSAIDS (%)	791 (43.9)	440 (38.2)	351 (54.0)	<0.001
Colchicine (%)	20 (1.1)	15 (1.3)	5 (0.8)	0.421
Steroids (%)	29 (1.6)	19 (1.7)	10 (1.5)	1.000
IV inotropic agent (%)	3 (0.9)	1 (0.4)	2 (1.7)	0.568
Antihyperglycemic[2] (%)	175 (22.5)	96 (18.0)	79 (32.1)	<0.001
Statins (%)	1007 (55.9)	565 (49.1)	442 (68.0)	<0.001
Ezetimibe (%)	367 (20.4)	189 (16.4)	178 (27.4)	<0.001

[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 STEMI	STEMI
n	1801	1151	650
No. of days in ICCU/Cardiology (median [IQR])	3 [2 , 4]	3 [2 , 4]	3 [3 , 5]
Total hospital days (median [IQR])	3 [2 , 4]	3 [2 , 4]	3 [3 , 5]

1.13 Discharge

1.13.1 Medical Treatment on Discharge

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

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

	Total	Non STEMI	STEMI	p-value
n	1720	1084	636	
Anti-platelets				
Aspirin (%)	1320 (76.7)	806 (74.4)	514 (80.8)	0.003
P2Y12 inhibitors (%)	1271 (73.9)	748 (69.0)	523 (82.2)	<0.001
Clopidogrel (%)	392 (22.8)	315 (29.1)	77 (12.1)	<0.001
Prasugrel (%)	500 (29.1)	203 (18.7)	297 (46.7)	<0.001
Ticagrelor (%)	379 (22.0)	230 (21.2)	149 (23.4)	0.314
Anticoagulants				
Oral anticoagulants[1] (%)	129 (7.5)	84 (7.7)	45 (7.1)	0.677
Warfarin (%)	8 (0.5)	6 (0.6)	2 (0.3)	0.737
Dabigatran (%)	1720 (100.0)	1084 (100.0)	636 (100.0)	NA
Rivaroxaban (%)	11 (0.6)	7 (0.6)	4 (0.6)	1.000
Apixaban (%)	110 (6.4)	71 (6.5)	39 (6.1)	0.811
Other				
ACE-I (%)	739 (43.0)	408 (37.6)	331 (52.0)	<0.001
ARB (%)	339 (19.7)	228 (21.0)	111 (17.5)	0.082
Spironolactone (%)	253 (14.7)	121 (11.2)	132 (20.8)	<0.001
Beta Blockers (%)	1052 (61.2)	615 (56.7)	437 (68.7)	<0.001
Digoxin (%)	5 (0.3)	2 (0.2)	3 (0.5)	0.546
CCB (%)	251 (14.6)	190 (17.5)	61 (9.6)	<0.001
Amiodarone (%)	52 (3.0)	35 (3.2)	17 (2.7)	0.614
Other Anti-Arrhythmic (%)	6 (0.3)	3 (0.3)	3 (0.5)	0.812
Nitrates (%)	46 (2.7)	40 (3.7)	6 (0.9)	0.001
Diuretics (%)	227 (13.2)	161 (14.9)	66 (10.4)	0.010
PPI (%)	1019 (59.2)	614 (56.6)	405 (63.7)	0.005
H2 Blockers (%)	23 (1.3)	18 (1.7)	5 (0.8)	0.191
Colchicine (%)	34 (2.0)	19 (1.8)	15 (2.4)	0.489
Steroids (%)	4 (1.2)	2 (0.9)	2 (1.8)	0.904
Antihyperglycemic[2] (%)	309 (40.2)	197 (37.3)	112 (46.7)	0.018
Glucagon-Like Peptide-1 receptor agonists (GLP1-RA)[2] (%)	40 (5.4)	21 (4.0)	19 (8.6)	0.020
Sodium-Glucose Cotransporter-2 (SGLT2) Inhibitors[2] (%)	307 (17.8)	184 (17.0)	123 (19.3)	0.241
Statins (%)	1397 (81.2)	865 (79.8)	532 (83.6)	0.056
Ezetimibe (%)	489 (28.4)	283 (26.1)	206 (32.4)	0.006

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

[2] Only among diabetic patients

1.13.2 Discharge Destination

Table 1.29.b: Discharge Destination

	Total	Non STEMI	STEMI
n	1720	1084	636
Discharged to:			
Home	1525 (88.8)	966 (89.3)	559 (88.0)
Internal medicine	64 (3.7)	33 (3.0)	31 (4.9)
Cardiothoracic surgery	75 (4.4)	59 (5.5)	16 (2.5)
Other hospital	26 (1.5)	17 (1.6)	9 (1.4)
Other ward	20 (1.2)	4 (0.4)	16 (2.5)
Nursing home	7 (0.4)	3 (0.3)	4 (0.6)

1.14 Mortality and Major Adverse Cardiac Event (MACE)

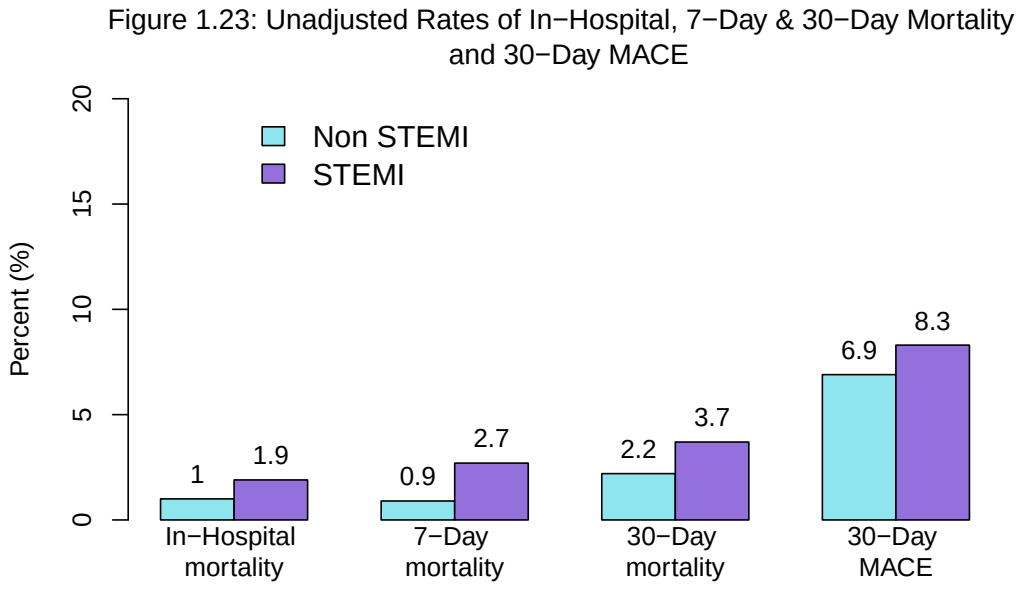
1.14.1 Rates of Mortality and MACE by discharge diagnosis

Unadjusted rates of in-hospital mortality, 7- and 30- days mortality were significantly higher for patients with STEMI compared to those with non STEMI.
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 STEMI.

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

	Total	Non STEMI	STEMI	p-value
n	1801	1151	650	
In-hospital mortality (%)	23 (1.3)	11 (1.0)	12 (1.9)	0.200
7-day mortality (%)	18 (1.6)	6 (0.9)	12 (2.7)	0.029
30-day mortality (%)	30 (2.8)	14 (2.2)	16 (3.7)	0.183
MACE[1] (%)	81 (7.5)	45 (6.9)	36 (8.3)	0.471

[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



After adjustment for age and other risk factors, 7-day mortality rates were significantly higher for patients with STEMI compared to those with non STEMI.

Table 1.31: Mortality Rates by Discharge Diagnosis Adjusted for Age and Other Risk Factors

	Odds Ratio (OR) (STEMI vs. Non STEMI) with 95% Confidence Intervals (CI)	
	Age adjusted	Risk factors adjusted[1]
In-Hospital	2 (0.86,4.66)	3.36 (0.76,17.94)
7-Days	3.27 (1.25,9.53)	7.02 (1.41,54.88)
30-Days	1.96 (0.94,4.16)	4.74 (1.54,16.7)
MACE[2]	1.31 (0.82,2.08)	1.41 (0.79,2.51)

[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	1801	339	1461	
In-hospital mortality (%)	23 (1.3)	5 (1.5)	18 (1.3)	0.944
7-day mortality (%)	18 (1.6)	4 (1.9)	14 (1.5)	0.971
30-day mortality (%)	30 (2.8)	6 (3.0)	24 (2.8)	1.000
MACE[1] (%)	81 (7.5)	24 (11.7)	57 (6.5)	0.018

[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	1.05 (0.34,2.73)	1.13 (0.15,5.55)
7-Days mortality	1.22 (0.34,3.57)	1.35 (0.18,6.63)
30-Days mortality	0.89 (0.32,2.12)	0.4 (0.06,1.63)
MACE[2]	1.7 (1,2.84)	1.62 (0.84,3.03)

[1] Adjusted for age, past ACS, diabetes, hypertension, killip class ≥ 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.