

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

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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.

ACSYS 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 1644 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.

ACSYS 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.

ACSYS 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:



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

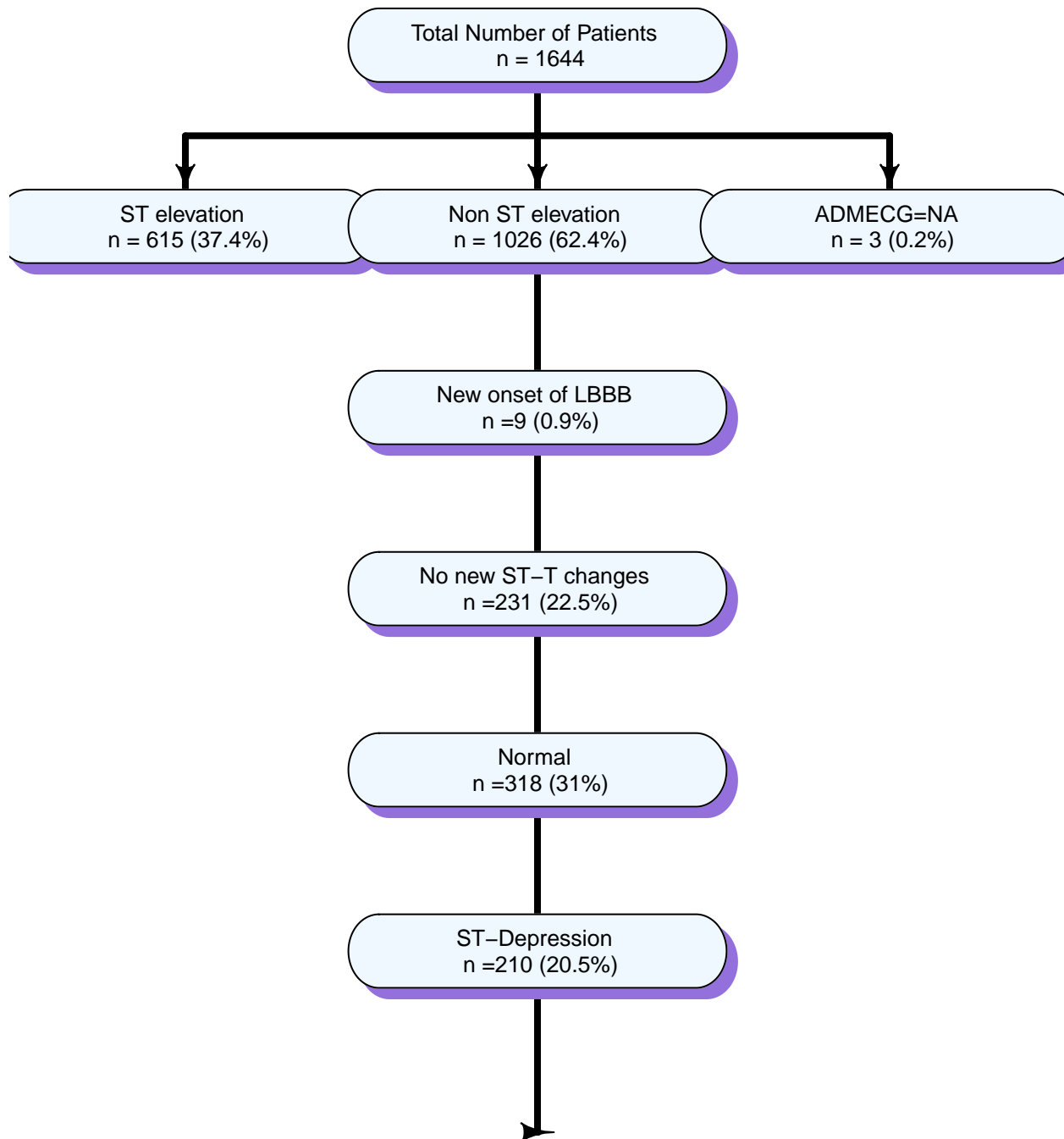


Figure 1.1.b: Distribution of Patients with ACS by Discharge Diagnosis

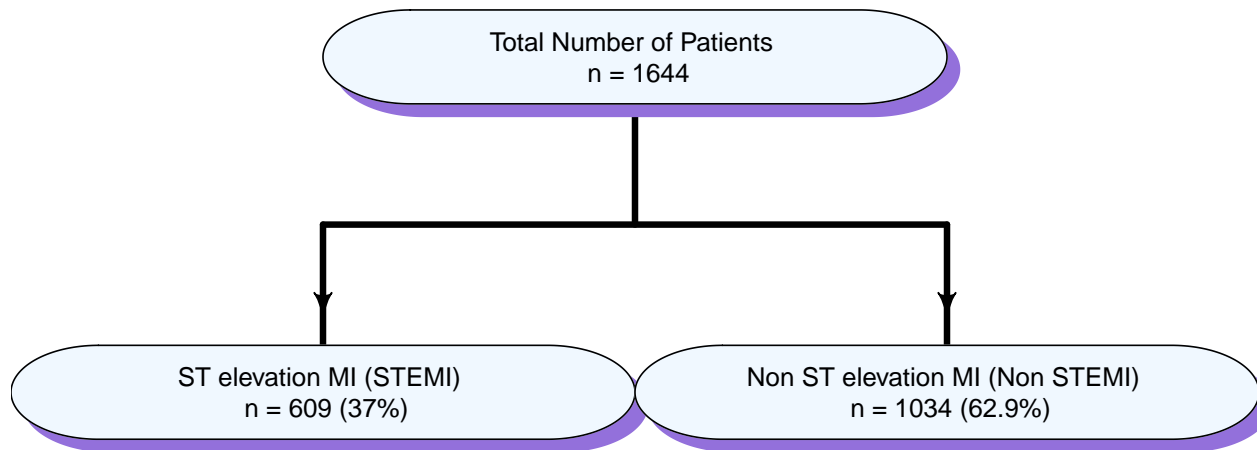
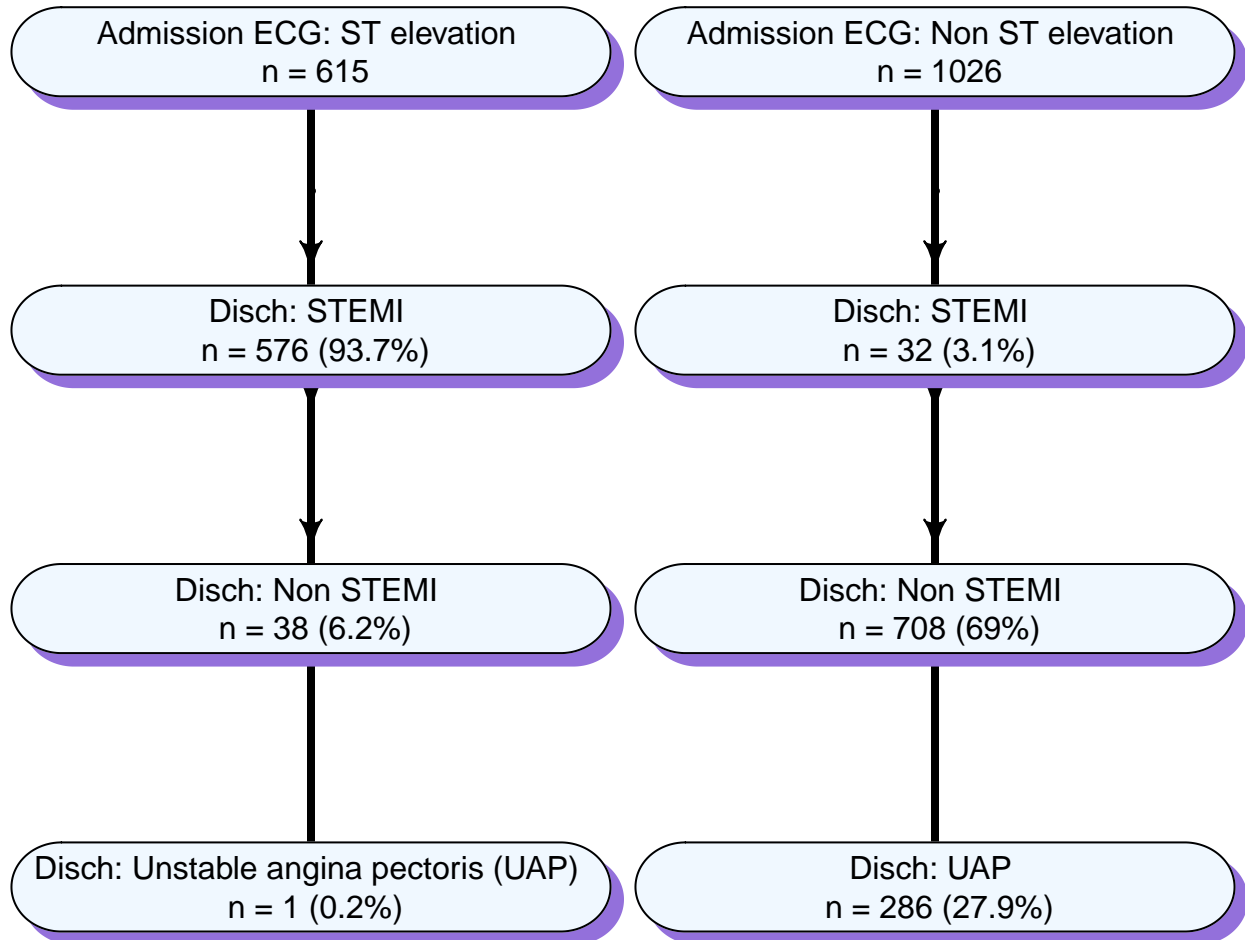


Figure 1.1.c: Admission versus Discharge Diagnosis



1.2 Demographic Characteristics

1.2.1 Age Distribution by ECG on Admission

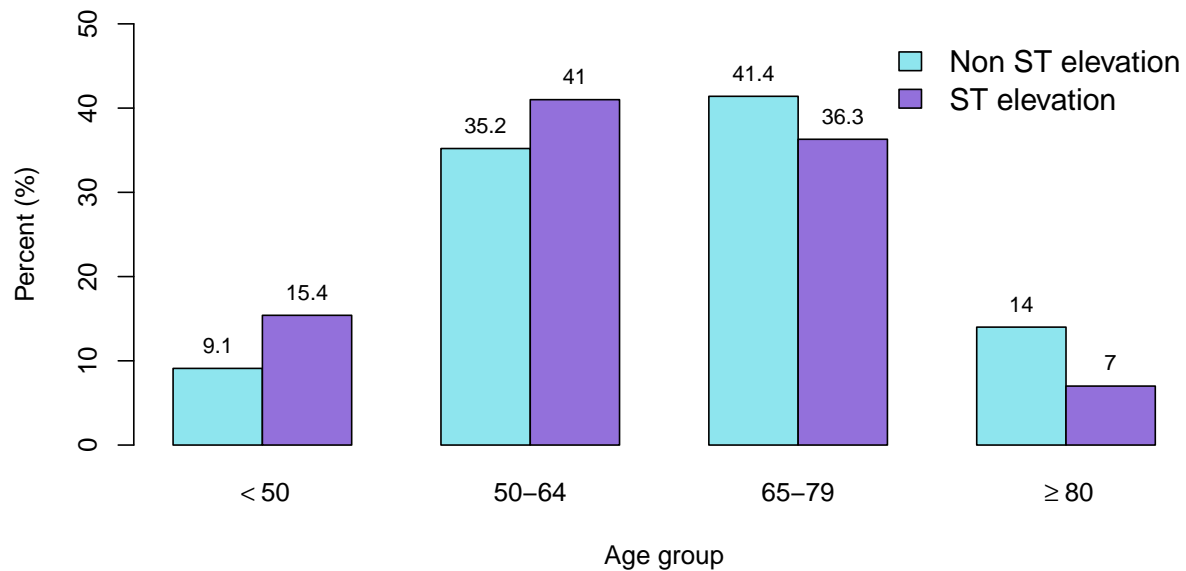
Patients with ST elevation were younger (mean age: 62.5 ± 12.1) than those with non ST elevation (mean age: 66.2 ± 12), and the age distribution of patients with ST elevation indicated a greater proportion of younger patients (56.6% were aged < 65 years) than that of patients with non ST elevation (44.4% aged < 65 years).

Table 1.1: Age Distribution by ECG on Admission

	Total	Non ST elevation	ST elevation	p-value
n	1644	1026	615	
Age groups (%)				<0.001
< 50	189 (11.5)	94 (9.2)	95 (15.4)	
50-64	616 (37.5)	362 (35.3)	253 (41.1)	
65-79	650 (39.6)	426 (41.5)	224 (36.4)	
≥ 80	188 (11.4)	144 (14.0)	43 (7.0)	
Age (mean(sd))	64.78 (12.16)	66.15 (12.01)	62.47 (12.06)	<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

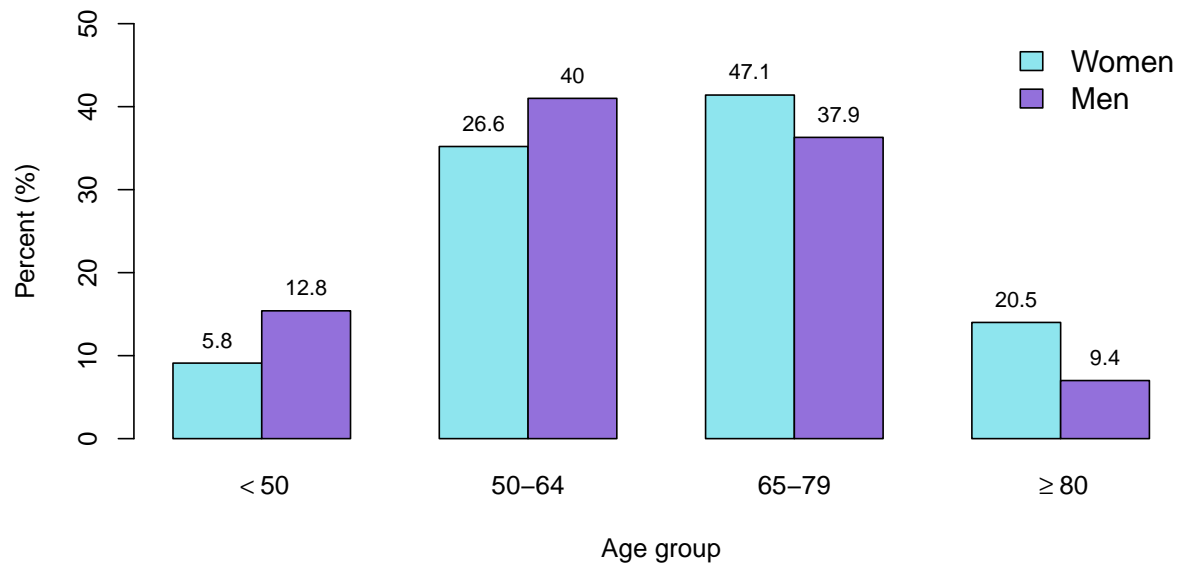
The age distribution of male patients was significantly different from that of female patients. The majority of men (52.8%) were in the younger age groups (< 65) and only 9.4% were aged 80 or above. 12.8% of men were less than 50 years old. By contrast, the majority of the female patients were in the older age groups ≥ 65 (67.5%). The number of women under the age of 50 was significantly lower than of their male counterparts (5.8%), and 20.5% were aged 80 or above.

Table 1.2: Age Distribution by Gender

	Total	Women	Men	p-value
n	1644	308	1335	
Age groups (%)				<0.001
< 50	189 (11.5)	18 (5.8)	171 (12.8)	
50-64	616 (37.5)	82 (26.6)	534 (40.0)	
65-79	650 (39.6)	145 (47.1)	505 (37.8)	
≥ 80	188 (11.4)	63 (20.5)	125 (9.4)	
Age (mean(sd))	64.78 (12.16)	69.83 (11.74)	63.61 (11.96)	<0.001

Percentages are calculated out of available data

Figure 1.3: Age Distribution by Gender



1.2.3 Gender Distribution

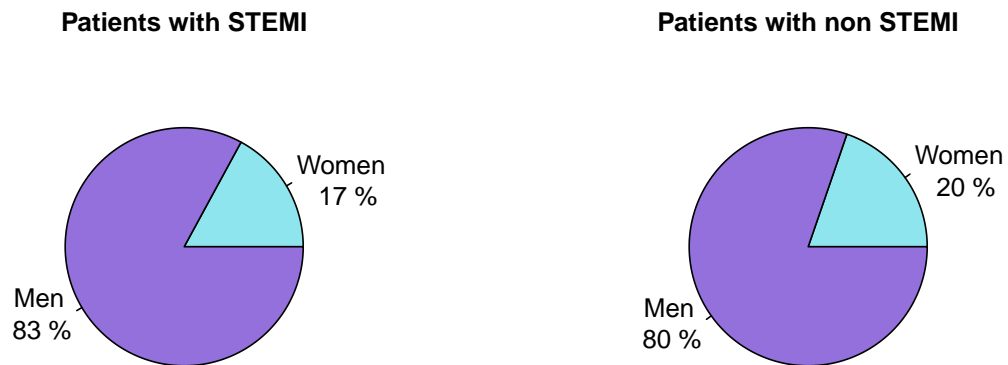
For both STEMI and Non STEMI patients we observed a clear male predominance.

Table 1.3: Gender Distribution

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
Women (%)	308 (18.7)	204 (19.7)	104 (17.1)	0.206
Men (%)	1335 (81.3)	830 (80.3)	505 (82.9)	

Percentages are calculated out of available data

Figure 1.4: Gender Distribution



1.3 Cardiovascular History

1.3.1 Cardiovascular History

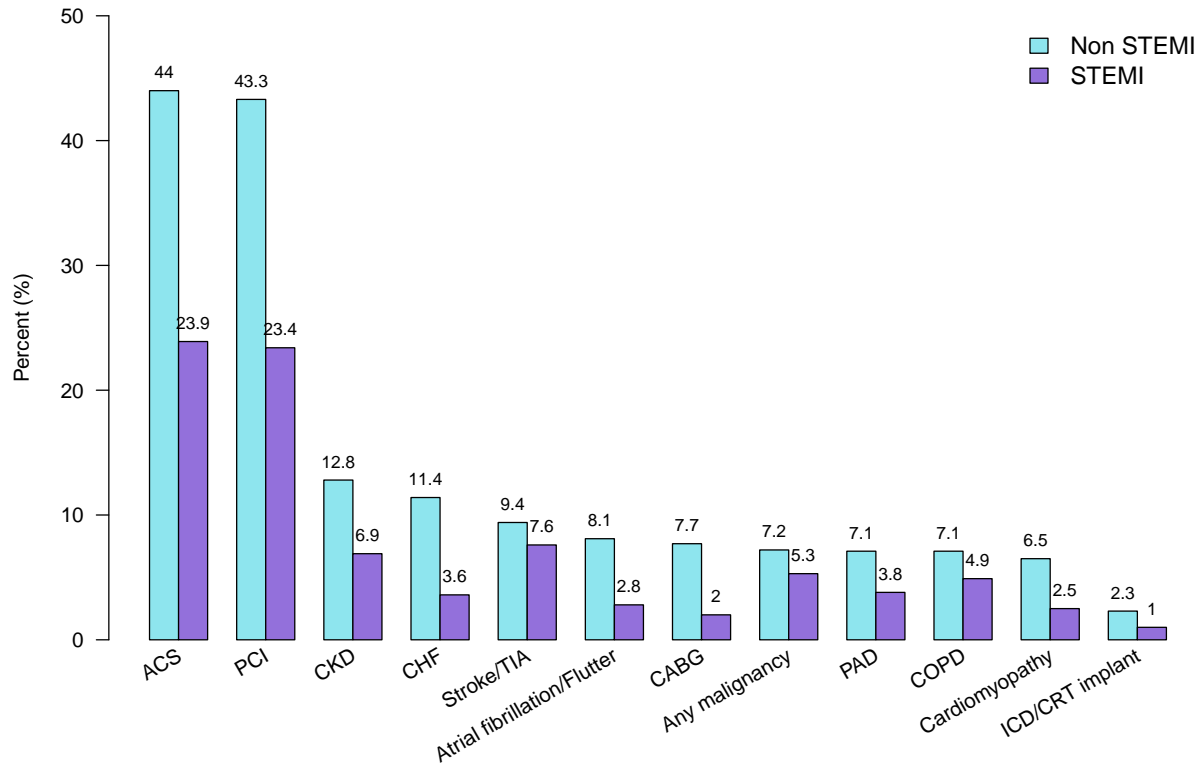
A history of ACS, cardiomyopathy, congestive heart failure (CHF), chronic renal failure, peripheral artery disease (PAD) and atrial fibrillation were significantly more frequent among patients with non STEMI. Similarly, more patients with non STEMI had undergone percutaneous coronary intervention (PCI)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

Table 1.4: Prior Cardiovascular History

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
ACS (%)	599 (36.6)	454 (44.0)	145 (23.9)	<0.001
CABG (%)	92 (5.6)	80 (7.7)	12 (2.0)	<0.001
PCI (%)	589 (35.9)	447 (43.3)	142 (23.4)	<0.001
Cardiomyopathy (%)	82 (5.0)	67 (6.5)	15 (2.5)	<0.001
CHF (%)	140 (8.5)	118 (11.4)	22 (3.6)	<0.001
Chronic Kidney Disease (CKD) (%)	174 (10.6)	132 (12.8)	42 (6.9)	<0.001
PAD (%)	96 (5.9)	73 (7.1)	23 (3.8)	0.010
Stroke/Transient ischemic attack (TIA) (%)	143 (8.7)	97 (9.4)	46 (7.6)	0.234
Chronic Obstructive Pulmonary Disease (COPD) (%)	103 (6.3)	73 (7.1)	30 (4.9)	0.104
Atrial fibrillation/Flutter (%)	101 (6.2)	84 (8.1)	17 (2.8)	<0.001
Implantable cardioverter-defibrillators (ICD)/Cardiac resynchronization therapy (CRT) implant (%)	28 (1.8)	22 (2.3)	6 (1.0)	0.107
Any malignancy (%)	99 (6.5)	68 (7.2)	31 (5.3)	0.180
Thyroid disease (%)	64 (4.2)	46 (4.9)	18 (3.1)	0.125

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. No difference were found in the prevalence of family history of coronary artery disease (CAD) or in newly diagnosed diabetes.

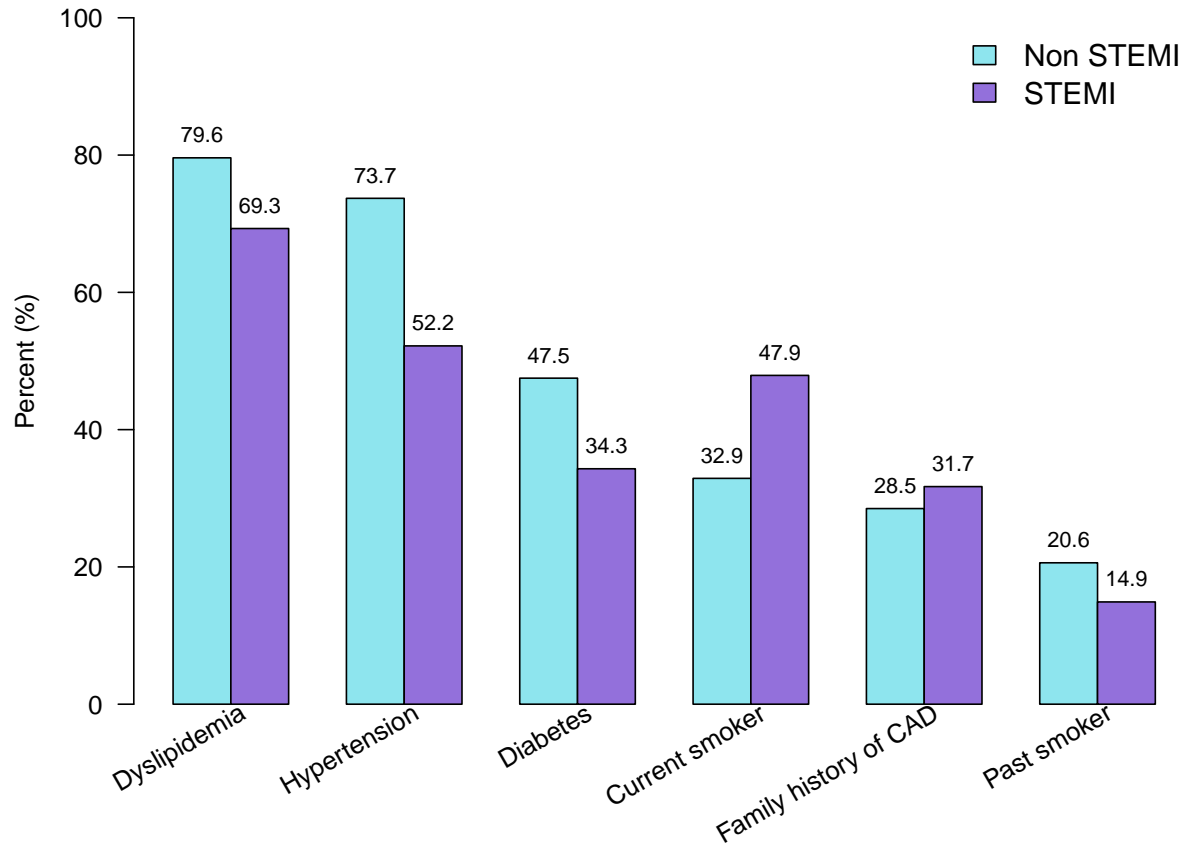
Table 1.5: Risk Factors

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
Hypertension (%)	1076 (65.7)	759 (73.7)	317 (52.2)	<0.001
Diabetes (%)	700 (42.6)	491 (47.5)	209 (34.3)	<0.001
Newly diagnosed (%)*	28 (4.0)	15 (3.1)	13 (6.2)	0.086
Dyslipidemia (%)	1239 (75.8)	819 (79.6)	420 (69.3)	<0.001
Current smoker (%)	632 (38.5)	340 (32.9)	292 (47.9)	<0.001
Past smoker (%)	304 (18.5)	213 (20.6)	91 (14.9)	0.005
Family history of CAD (%)	419 (29.7)	254 (28.5)	165 (31.7)	0.228

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 (49.1%) were being treated with aspirin compared to those with STEMI (29.5%). 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. 9.1% of patients with non STEMI and 2.8% of those with STEMI were being treated with clopidogrel.

Table 1.6: Prior Chronic Treatment

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
Anti-platelets				
Aspirin (%)	582 (41.7)	426 (49.1)	156 (29.5)	<0.001
P2Y12 (%)	147 (10.5)	119 (13.7)	28 (5.3)	<0.001
Clopidogrel (%)	94 (6.7)	79 (9.1)	15 (2.8)	<0.001
Prasugrel (%)	28 (2.0)	20 (2.3)	8 (1.5)	0.411
Ticagrelor (%)	32 (2.3)	25 (2.9)	7 (1.3)	0.090
Anticoagulants				
Oral anticoagulants ¹ (%)	84 (6.0)	68 (7.8)	16 (3.0)	<0.001
Direct oral anticoagulation (DOAC) ² (%)	78 (5.6)	62 (7.1)	16 (3.0)	0.002
Warfarin (%)	6 (0.4)	6 (0.7)	0 (0.0)	0.136
Dabigatran (%)	4 (0.3)	2 (0.2)	2 (0.4)	1.000
Rivaroxaban (%)	14 (1.0)	9 (1.0)	5 (0.9)	1.000
Apixaban (%)	2.04 (0.20)	2.06 (0.24)	2.02 (0.13)	<0.001
Other				
ACE-I (%)	309 (22.1)	231 (26.6)	78 (14.8)	<0.001
ARB (%)	228 (16.3)	160 (18.4)	68 (12.9)	0.008
Beta Blockers (%)	398 (28.5)	304 (35.0)	94 (17.8)	<0.001
Calcium channel blockers (CCB) (%)	205 (14.7)	154 (17.7)	51 (9.7)	<0.001
Nitrates (%)	20 (1.4)	19 (2.2)	1 (0.2)	0.005
Diuretics (%)	112 (8.0)	96 (11.1)	16 (3.0)	<0.001
Antihyperglycemic drugs ³ (%)	247 (15.0)	177 (17.1)	70 (11.5)	0.003
Statins ⁴ (%)	603 (43.2)	437 (50.3)	166 (31.4)	<0.001
Ezetimibe (%)	154 (11.0)	121 (13.9)	33 (6.2)	<0.001

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

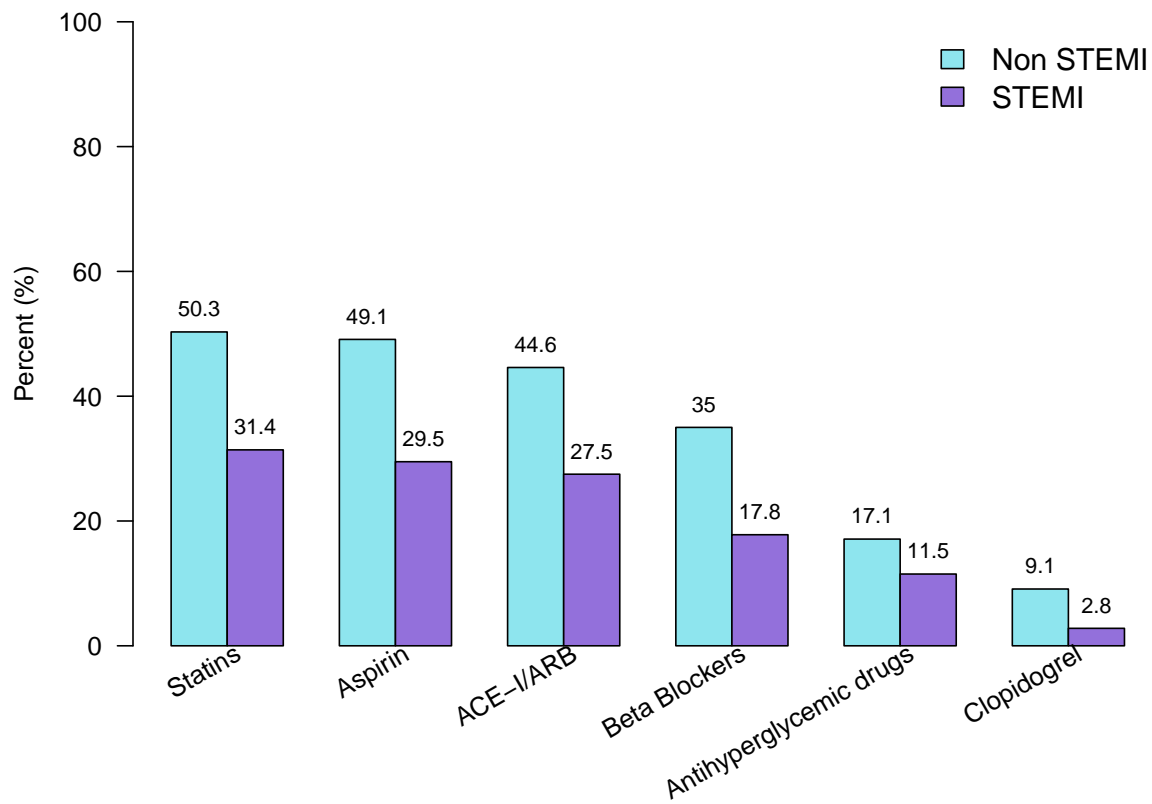
² Direct Oral anticoagulants include: Dabigatran, Rivaroxaban, Apixaban

³ Antihyperglycemic drugs include: Glibenclamide, Glipizide, Glimepiride, Metformin, Sitagliptine, Saxagliptine, Vidagliptine, Linagliptine, Exenatide, Liraglutide, Dapagliflozin, Acarbose, Meglitinides, 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

42.4% 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.

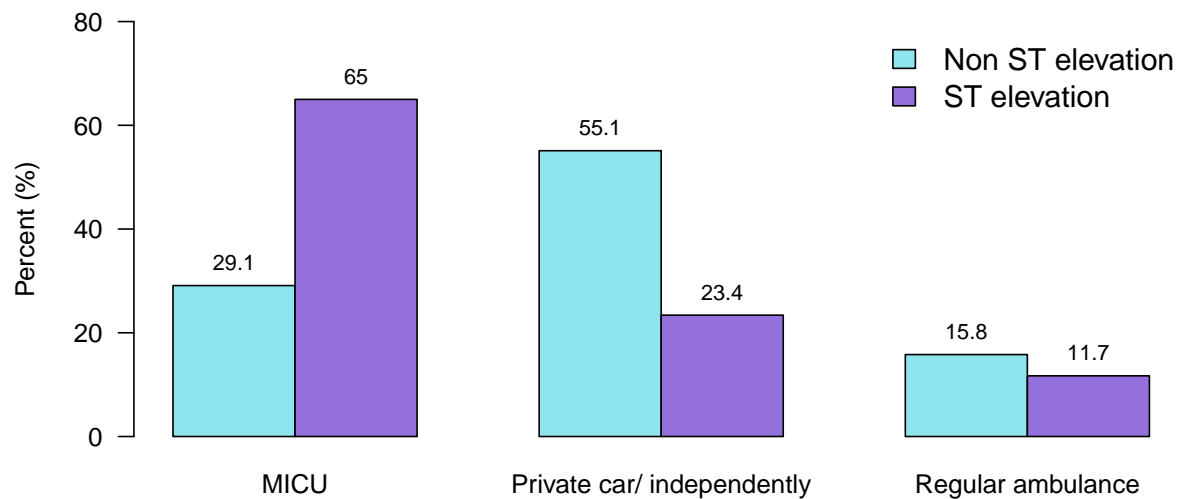
Table 1.7: Mode of Transportation by ECG on Admission

	Total	Non ST elevation	ST elevation
n ¹	1383	833	548
MICU (%)	598 (43.2)	242 (29.1)	356 (65.0)
Private car/ independently (%)	587 (42.4)	459 (55.1)	128 (23.4)
Regular ambulance (%)	198 (14.3)	132 (15.8)	64 (11.7)

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

43.2% 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.

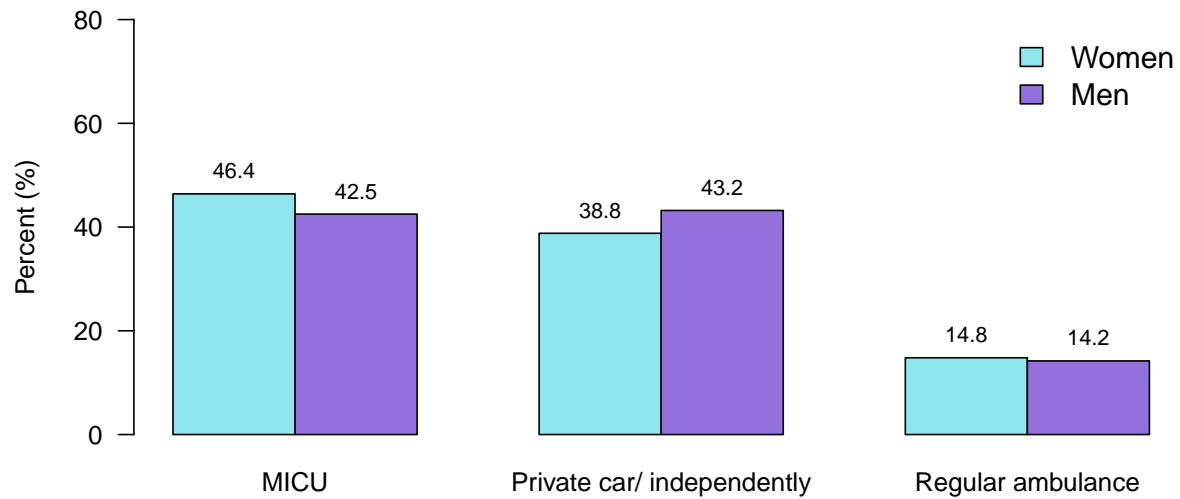
Table 1.8: Mode of Transportation by Gender

	Total	Women	Men
n ¹	1383	250	1133
MICU (%)	598 (43.2)	116 (46.4)	482 (42.5)
Private car/ independently (%)	587 (42.4)	97 (38.8)	490 (43.2)
Regular ambulance (%)	198 (14.3)	37 (14.8)	161 (14.2)

p-value = 0.425

¹ Excluded in-patients

Figure 1.9: Mode of Transportation by gender

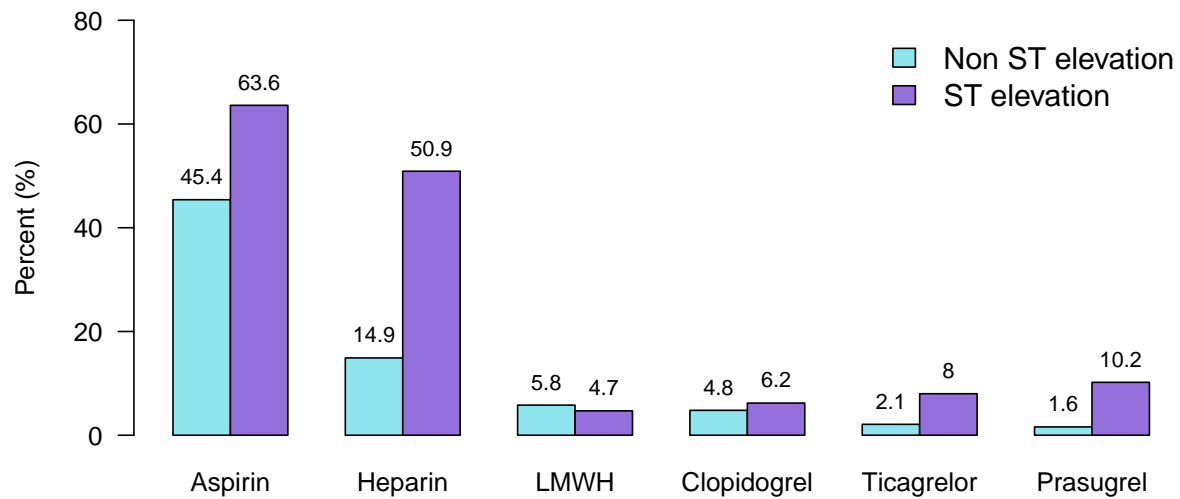


1.5.3 Drugs administered at the Emergency Department (ED)

Table 1.9: Drugs administered at the ED

	Total	Non ST elevation	ST elevation	p-value
n	1644	1026	615	
Aspirin (%)	608 (49.6)	432 (45.4)	175 (63.6)	<0.001
Clopidogrel (%)	63 (5.1)	46 (4.8)	17 (6.2)	0.463
Prasugrel (%)	43 (3.5)	15 (1.6)	28 (10.2)	<0.001
Ticagrelor (%)	42 (3.4)	20 (2.1)	22 (8.0)	<0.001
Heparin (%)	282 (23.0)	142 (14.9)	140 (50.9)	<0.001
Low Molecular Weight Heparin (LMWH) (%)	68 (5.5)	55 (5.8)	13 (4.7)	0.600

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	1644	1026	615
Directly to cardiology ward (%)	18 (1.1)	17 (1.7)	0 (0.0)
Directly to cath lab (%)	190 (11.6)	16 (1.6)	174 (28.3)
Directly to ICCU (%)	197 (12.0)	33 (3.2)	164 (26.7)
Directly to internal medicine ward (%)	4 (0.2)	3 (0.3)	1 (0.2)
ED (%)	1227 (74.7)	951 (92.7)	275 (44.7)
Other (%)	7 (0.4)	6 (0.6)	1 (0.2)
Patients arrived by MICU			
n	598	242	356
Directly to cardiology ward (%)	1 (0.2)	1 (0.4)	0 (0.0)
Directly to cath lab (%)	138 (23.1)	3 (1.2)	135 (37.9)
Directly to ICCU (%)	152 (25.4)	14 (5.8)	138 (38.8)
Directly to internal medicine ward (%)	2 (0.3)	1 (0.4)	1 (0.3)
ED (%)	304 (50.8)	222 (91.7)	82 (23.0)
Other (%)	1 (0.2)	1 (0.4)	0 (0.0)

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

1.5.5 First Ward of Admission

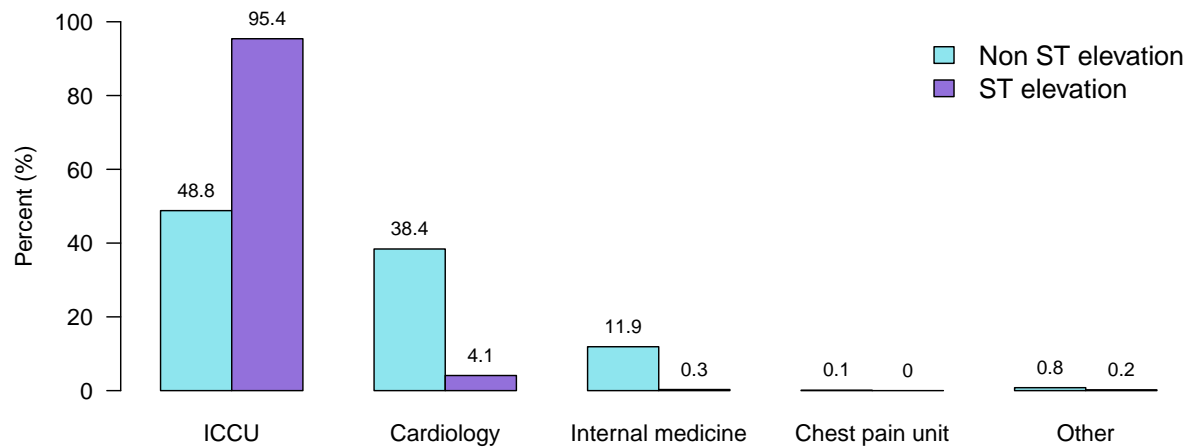
As expected, the majority of patients presenting with ST elevation were hospitalized in the ICCU (95.4%). 48.8% of the patients who presented with non ST elevation were admitted to the ICCU and an additional 38.4% to a cardiology department, with the remaining 11.9% being admitted to internal medicine departments.

Table 1.11: First Ward of Hospitalization

	Total	Non ST elevation	ST elevation
n	1644	1026	615
ICCU (%)	1090 (66.3)	501 (48.8)	587 (95.4)
Cardiology (%)	419 (25.5)	394 (38.4)	25 (4.1)
Internal medicine (%)	124 (7.5)	122 (11.9)	2 (0.3)
Chest pain unit (%)	1 (0.1)	1 (0.1)	0 (0.0)
Other (%)	9 (0.5)	8 (0.8)	1 (0.2)

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

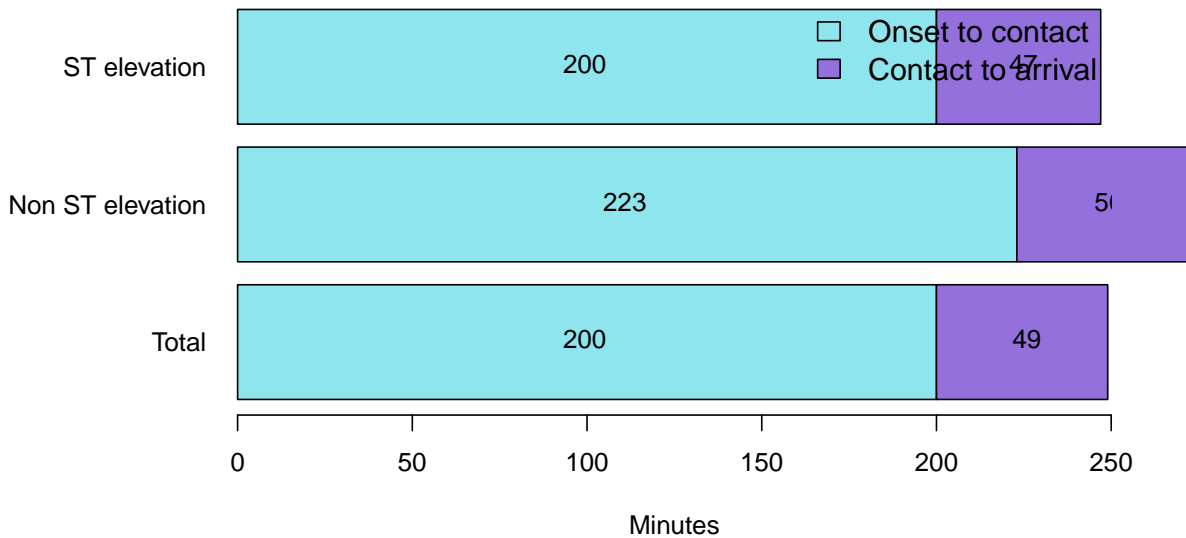
All time frames were significantly shorter for patients with ST elevation. Patients with ST elevation sought help earlier when compared to patients with non ST elevation.

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

	Total	Non ST elevation	ST elevation	p-value
n ¹	941	482	456	
Onset to first medical contact, minutes (median [IQR])	200.00 [80.50, 322.50]	223.00 [86.00, 325.00]	200.00 [79.50, 313.50]	0.400
First medical contact to arrival, minutes (median [IQR])	49.00 [33.00, 77.00]	50.00 [35.00, 88.00]	47.00 [31.00, 70.00]	0.011
Onset to arrival, minutes (median [IQR])	159.00 [90.00, 432.00]	210.00 [104.00, 611.00]	140.00 [80.00, 281.50]	<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



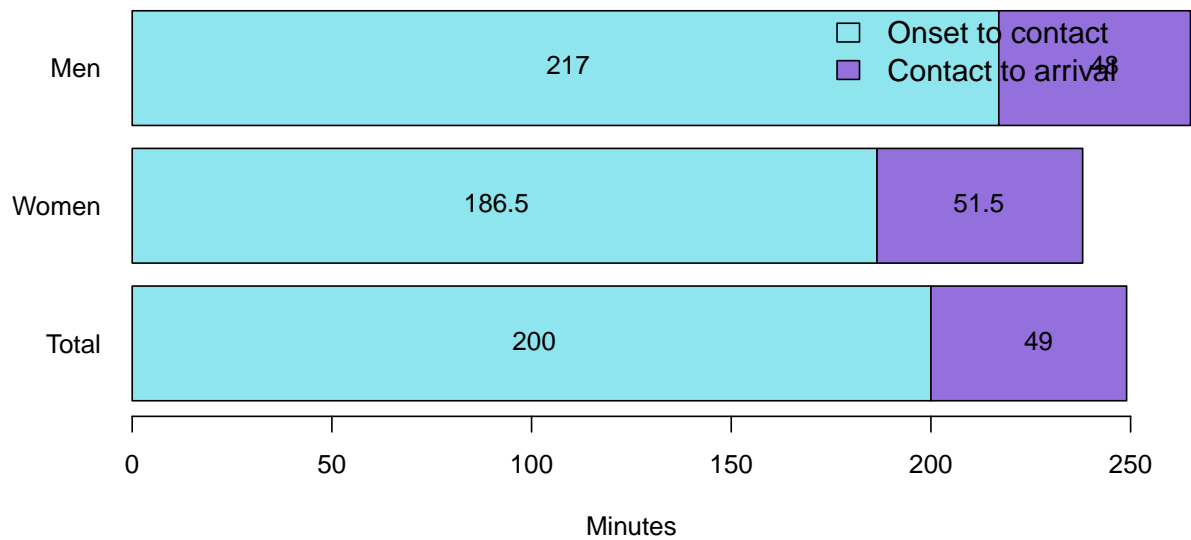
1.5.7 Time from Symptom Onset to Hospital Arrival, by gender

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

	Total	Women	Men	p-value
n ¹	941	183	757	
Onset to first medical contact, minutes (median [IQR])	200.00 [80.50, 322.50]	186.50 [62.50, 297.25]	217.00 [92.00, 325.00]	0.090
First medical contact to arrival, minutes (median [IQR])	49.00 [33.00, 77.00]	51.50 [38.00, 76.50]	48.00 [32.00, 78.00]	0.185
Onset to arrival, minutes (median [IQR])	159.00 [90.00, 432.00]	180.00 [111.50, 462.00]	152.50 [87.50, 407.00]	0.146

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

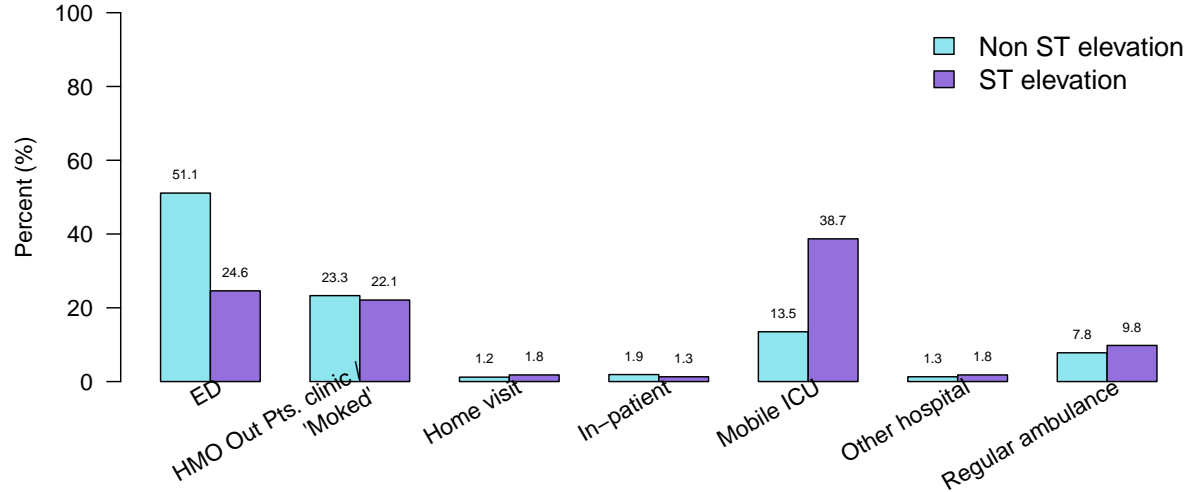
41.1% of patients had the first medical contact at the ED and about 22.9% at a Health maintenance organization (HMO) primary clinic/“Moked”. For an additional 22.9% the primary medical contact was with MICU. Patients with ST elevation were more likely to have their first medical contact with a MICU (38.7%) than those with non ST elevation (13.5%).

Table 1.14: First Medical Contact

	Total	Non ST elevation	ST elevation
n	1644	1026	615
ED (%)	675 (41.1)	524 (51.1)	151 (24.6)
HMO Out Pts. clinic / 'Moked' (%)	376 (22.9)	239 (23.3)	136 (22.1)
Home visit (%)	23 (1.4)	12 (1.2)	11 (1.8)
In-patient (%)	28 (1.7)	20 (1.9)	8 (1.3)
Mobile ICU (%)	376 (22.9)	138 (13.5)	238 (38.7)
Other hospital (%)	24 (1.5)	13 (1.3)	11 (1.8)
Regular ambulance (%)	141 (8.6)	80 (7.8)	60 (9.8)

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

Figure 1.14: First Medical Contact



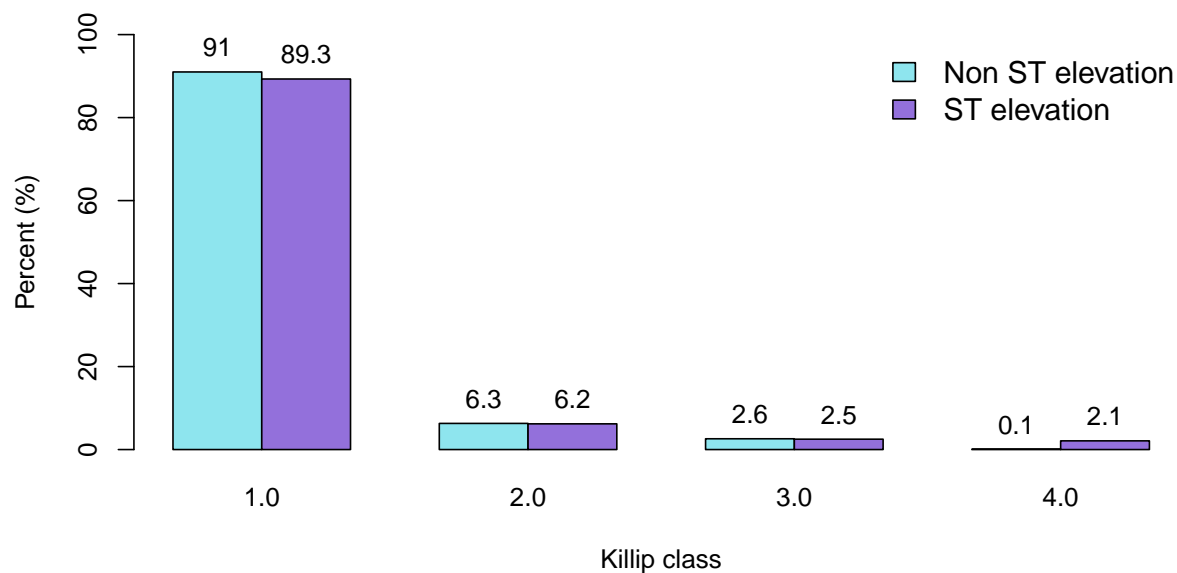
1.5.9 Presenting Symptoms and Killip Class

Typical angina was significantly more frequent in patients presenting with ST elevation (82.2%) than those presenting with non ST elevation (67.8%). However, atypical chest pain was more common in patients presenting with non ST elevation (11.4%) than in those with ST elevation (6.8%). Also dyspnea was more common in patients with non ST elevation (22.1%) than those with ST elevation (15.4%).

Table 1.15: Presenting Symptoms at First Medical Contact

	Total	Non ST elevation	ST elevation	p-value
n	1644	1026	615	
Typical angina (%)	1203 (73.3)	696 (67.8)	505 (82.2)	<0.001
Atypical chest pain (%)	159 (9.7)	117 (11.4)	42 (6.8)	0.003
Syncope (%)	37 (2.3)	20 (1.9)	17 (2.8)	0.366
Aborted Sudden Cardiac Death (SCD) (%)	10 (0.6)	3 (0.3)	7 (1.1)	0.072
Palpitations (%)	27 (1.6)	22 (2.1)	5 (0.8)	0.064
Dyspnea (%)	322 (19.6)	227 (22.1)	95 (15.4)	0.001
Abdominal pain (%)	78 (4.7)	41 (4.0)	37 (6.0)	0.082

Figure 1.15: Killip Class on Admission



1.5.10 Pre-Hospital Treatment (before ED arrival)

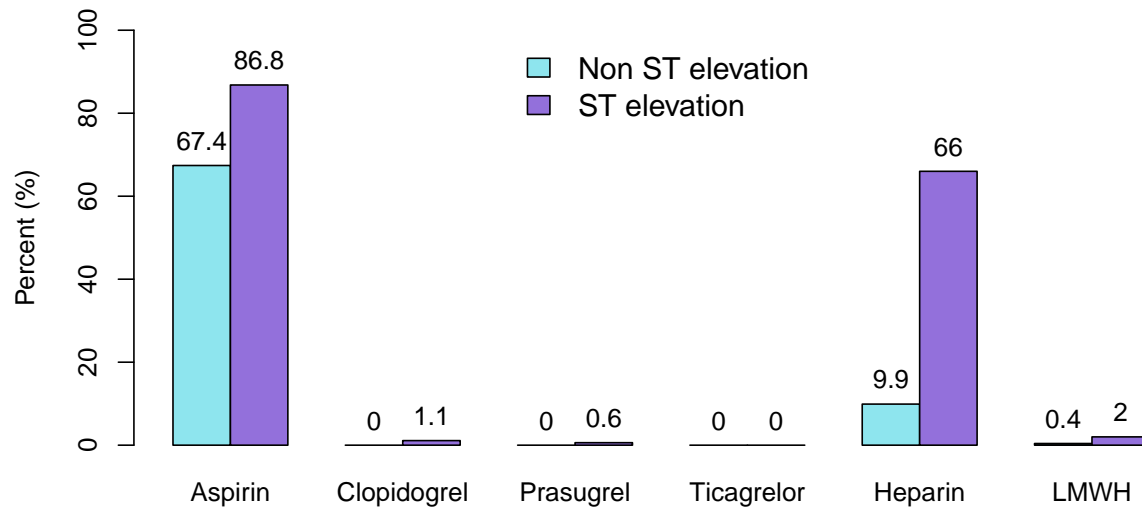
At first medical contact, patients with ST elevation were significantly more likely to receive therapy with aspirin and heparin than patients with non ST elevation.

Table 1.16 Pre-Hospitalization Treatment

	Total	Non ST elevation	ST elevation	p-value
n ¹	796	374	420	
Aspirin (%)	472 (78.9)	163 (67.4)	309 (86.8)	<0.001
Clopidogrel (%)	4 (0.7)	0 (0.0)	4 (1.1)	0.253
Prasugrel (%)	2 (0.3)	0 (0.0)	2 (0.6)	0.655
Ticagrelor (%)	0 (0.0)	0 (0.0)	0 (0.0)	NA
Heparin (%)	259 (43.3)	24 (9.9)	235 (66.0)	<0.001
LMWH (%)	8 (1.3)	1 (0.4)	7 (2.0)	0.208

¹ Only MICU and regular ambulance patients were included

Figure 1.16: Pre-Hospitalization Treatment

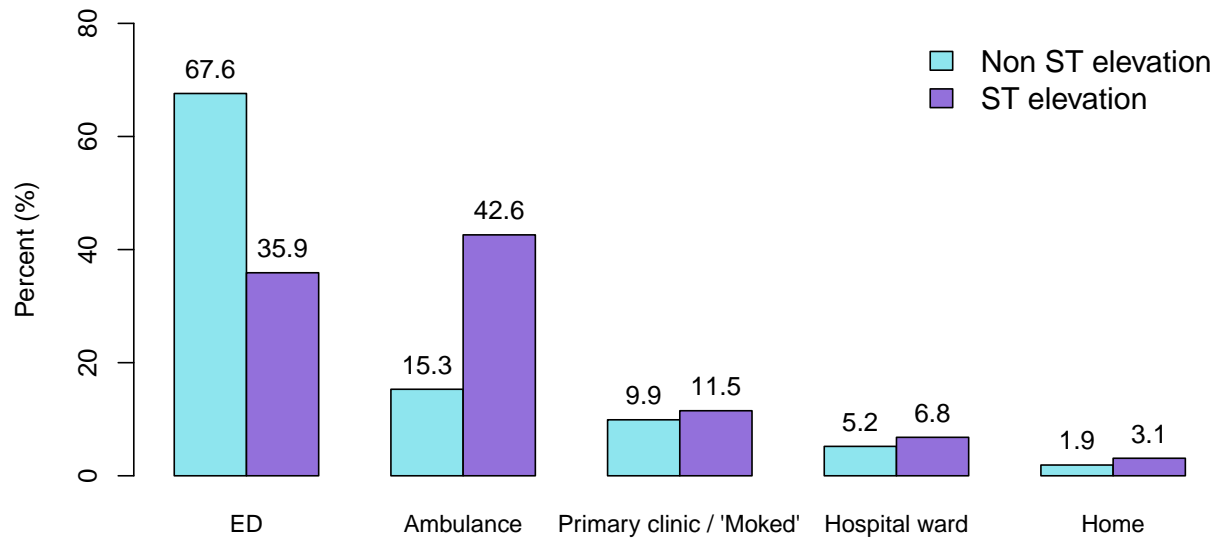


1.6 First Recorded ECG

1.6.1 Location of First ECG Recording

67.6% of patients presenting with non ST elevation and 35.9% of patients presenting with ST elevation had their first ECG recorded in the emergency department (ED). With respect to the remaining patients, 45.7% of patients with ST elevation and 17.2% of those with non ST elevation had the first ECG performed either at home or in an ambulance, and about 11% 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 93% of patients presented with a normal sinus rhythm (NSR). 2.8% of patients with ST elevation and 4% of those without ST elevation, presented with atrial fibrillation.

Table 1.17: First ECG Rhythm

	Total	Non ST elevation	ST elevation
n	1644	1026	615
NSR (%)	1429 (93.2)	905 (93.7)	523 (92.4)
Atrial fibrillation (%)	55 (3.6)	39 (4.0)	16 (2.8)
Ventricular Tachycardia (VT)/ Ventricular Fibrillation (VF) (%)	21 (1.4)	7 (0.7)	14 (2.5)
High degree (2nd / 3rd) Atrioventricular (AV) Block (%)	14 (0.9)	5 (0.5)	9 (1.6)
Asystole (%)	1 (0.1)	0 (0.0)	1 (0.2)
Other (%)	13 (0.8)	10 (1.0)	3 (0.5)

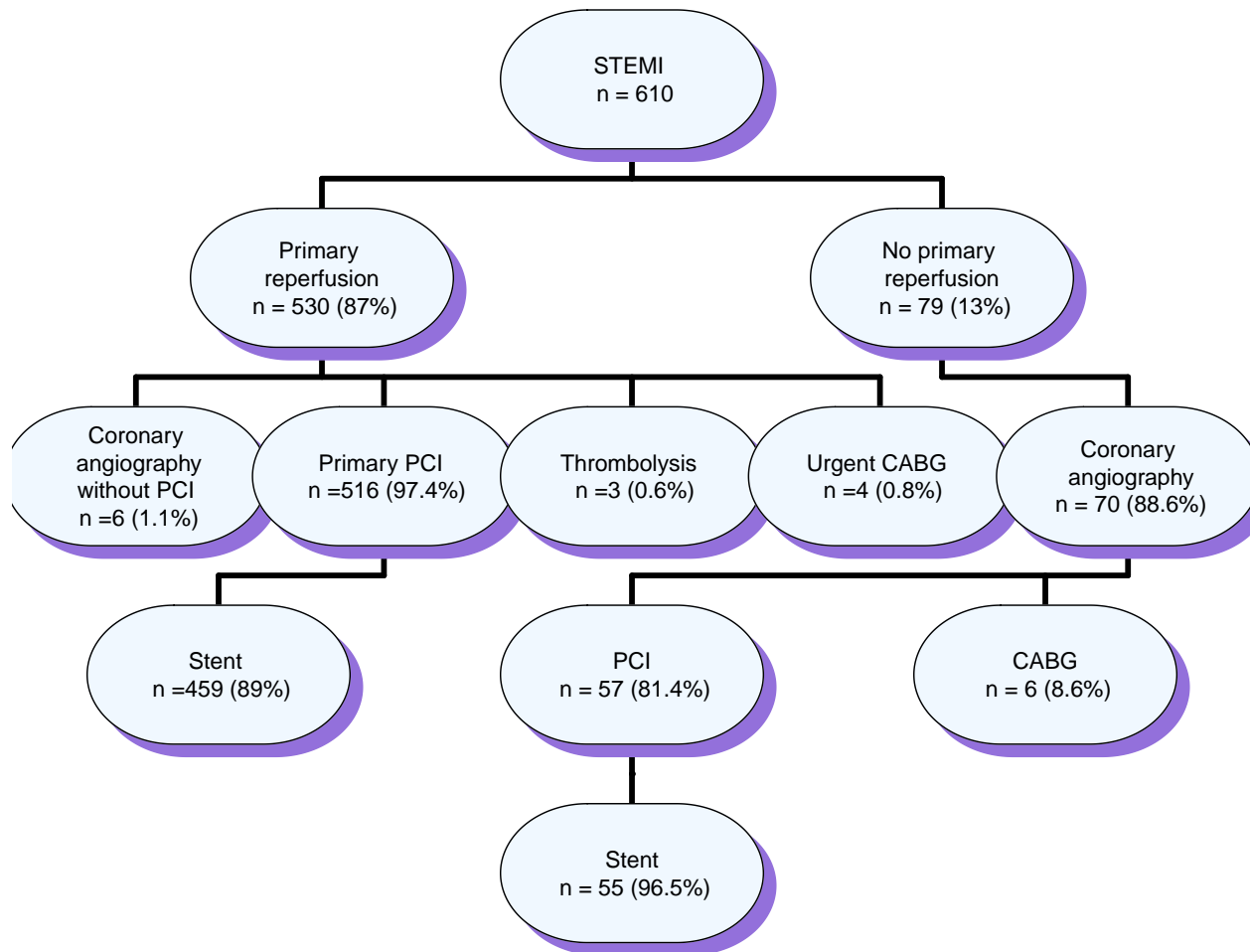
Difference in first ECG rhythm, ST elevation vs. non ST elevation, p 0.005

1.7 Primary Reperfusion

1.7.1 Primary Reperfusion Therapy in Patients with STEMI

87% of patients with STEMI underwent primary reperfusion within 12 hours from onset of symptoms, mainly primary PCI. In 89% of these cases, stents were deployed. Of the remaining 13% which did not undergo primary reperfusion, 88.6% 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

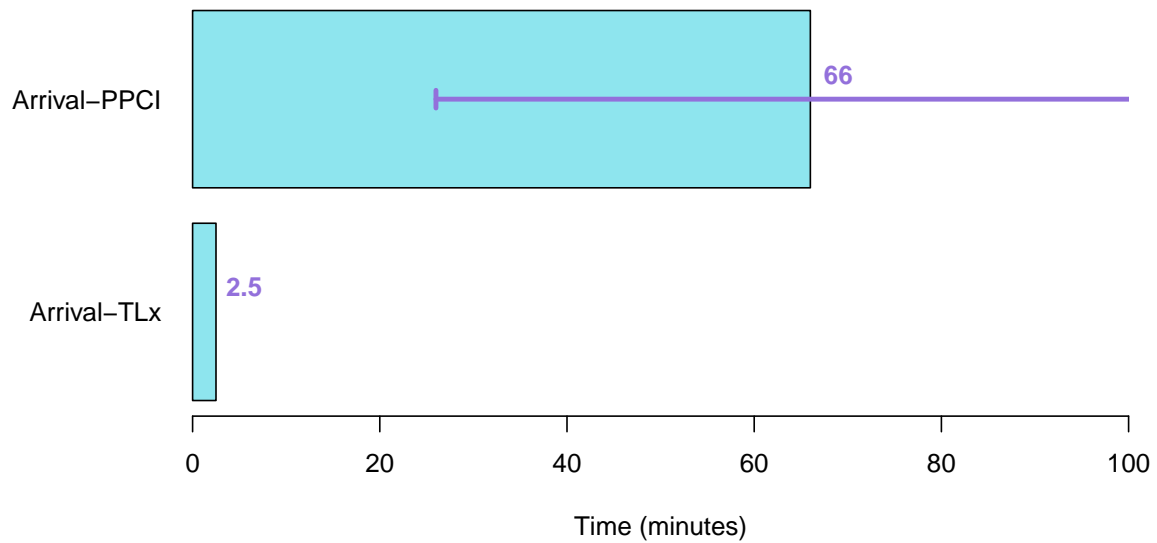
The median time from arrival to primary reperfusion was less than one hour (2.5 minutes).

There were no patients who undergo thrombolysis.

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

	N	Time in minutes (median [IQR])
From arrival to thrombolysis (TLx)	4	2.50 [1.75, 3.24]
From arrival to primary PCI (PPCI)	441	66.00 [26.00, 110.00]

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



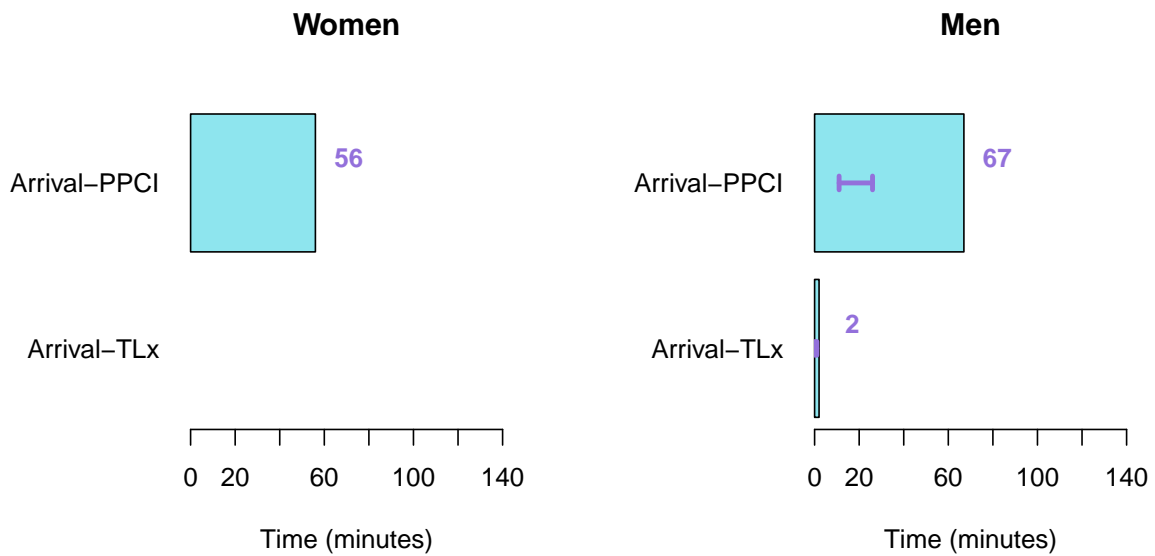
1.7.3 Length of Time from Arrival to Primary Reperfusion, by Gender

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

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

	Women		Men		p-value
	Time in minutes (median [IQR])	N	Time in minutes (median [IQR])	N	
From arrival to thrombolysis	NA [NA, NA]	0	2.5 [1.75, 3.24]	4	NA
From arrival to primary PCI	56 [21 , 101.5]	79	67 [26.75, 113]	412	0.075

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	530
IIb/IIIa antagonists (%)	135 (25.5)
Bivalirudin (%)	13 (2.5)
Aspiration device (%)	30 (5.7)

1.7.5 Primary PCI / Coronary Angiography

Table 1.21: Vascular access during Primary Reperfusion

	Overall
n	530
Vascular access	
Femoral	42 (8.3)
Radial	460 (90.9)
Both	4 (0.8)

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

In NA% 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 (93.6%).

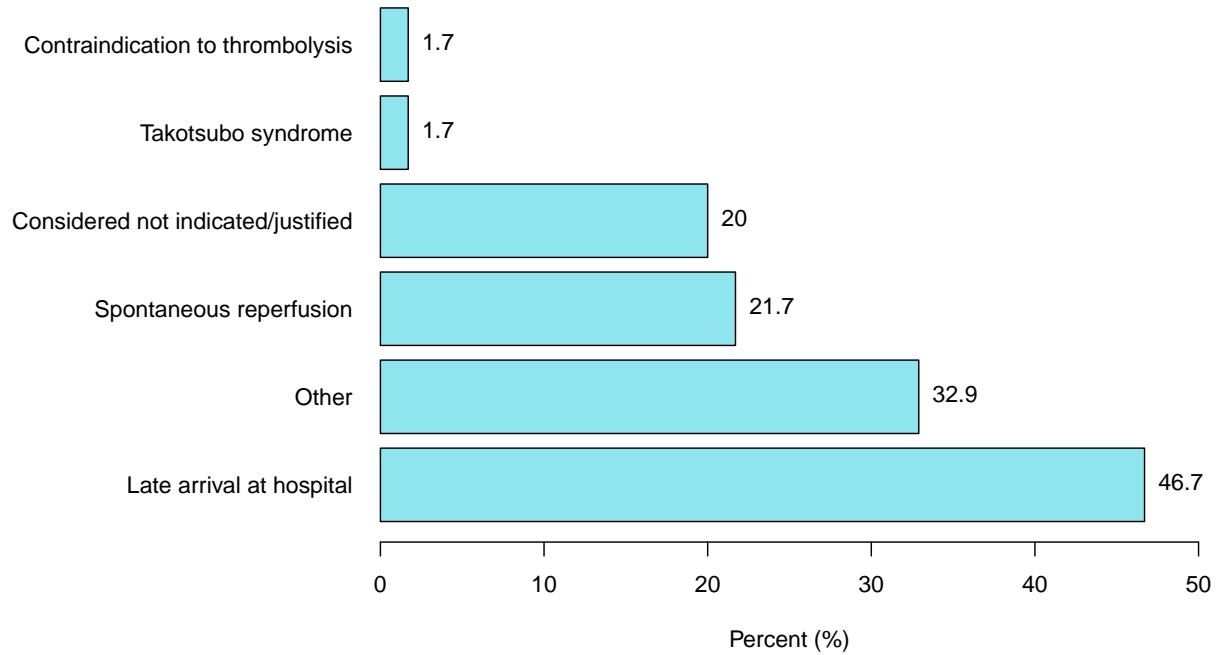
Table 1.22: TIMI Grade Flow of IRA Before and After Revascularization

	Before revascularization (%)	After revascularization (%)
n	456	498
0.0	283 (62.1)	7 (1.4)
1.0	71 (15.6)	3 (0.6)
2.0	51 (11.2)	22 (4.4)
3.0	51 (11.2)	466 (93.6)

1.7.7 Reasons for Not Performing Primary Reperfusion

13% of patients presenting with STEMI did not receive primary reperfusion therapy. In 21.3% the reason was spontaneous reperfusion, in 46.7% the reason was late arrival at the hospital, and in 20% of cases primary reperfusion was considered not indicated.

Figure 1.21: Reasons for Not Performing Primary Reperfusion
Number of Patients = 79



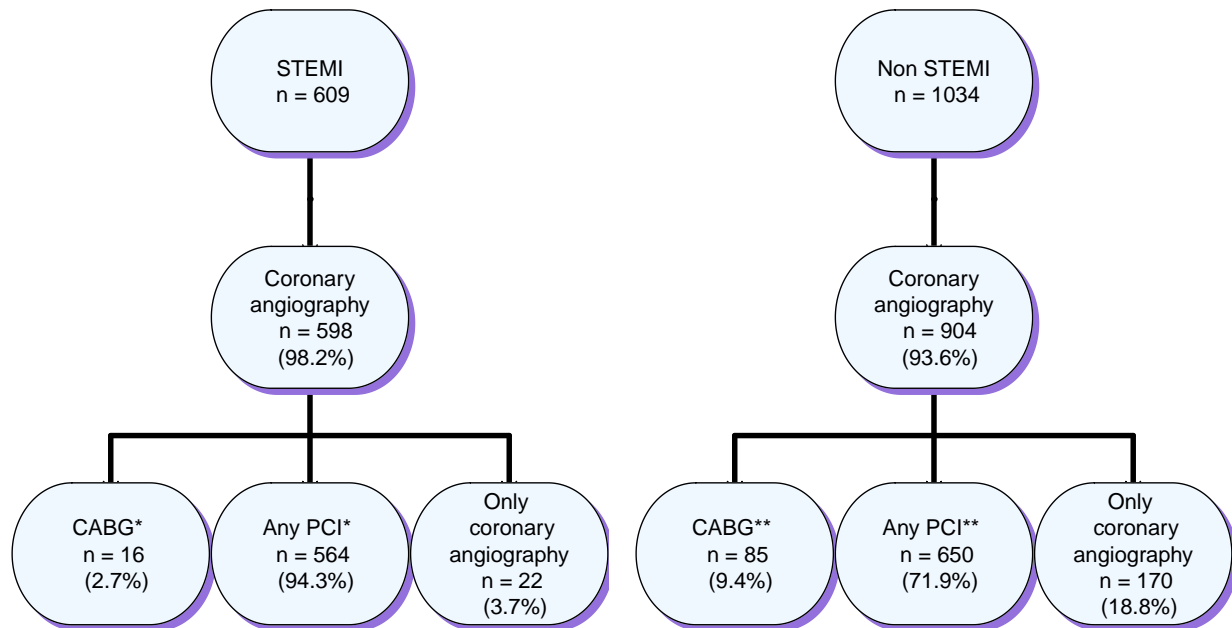
- There were no patients that died before decision or any patient refusal.

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



*4 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	1087
Coronary angiography	978 (90.1)
Vascular access:	
Femoral	48 (5.1)
Radial	888 (94.4)
Both	5 (0.5)

1.8.3 Other Procedures During Hospitalization

Patients with STEMI were more likely to receive Direct-Current (DC) shocks, resuscitation, mechanical ventilation, intra-aortic balloon pump (IABP) and temporary pacemaker than those with non STEMI.

Table 1.24: Other Procedures

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
DC shock (%)	51 (3.1)	16 (1.6)	35 (5.8)	<0.001
Resuscitation (%)	35 (2.1)	12 (1.2)	23 (3.8)	0.001
Mechanical ventilation (%)				0.028
Invasive	49 (3.0)	23 (2.2)	26 (4.3)	
Non invasive	39 (2.4)	21 (2.0)	18 (3.0)	
Intra-Aortic Balloon Pump (IABP) (%)	17 (1.1)	3 (0.3)	14 (2.4)	<0.001
Dialysis (%)	10 (0.6)	8 (0.8)	2 (0.3)	0.429
ICD/CRT (%)	12 (0.7)	7 (0.7)	5 (0.8)	0.974
Permanent pacemaker (%)	10 (0.6)	8 (0.8)	2 (0.3)	0.426
Temporary pacemaker (%)	10 (0.6)	2 (0.2)	8 (1.3)	0.013
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 90.8% of those with non STEMI. EF was normal in a larger proportion of patients with non STEMI (49.8%) than in patients with STEMI (21.1%). 29.9% of patients with STEMI and 15.4% of patients with non STEMI presented with an EF < 40%.

Table 1.25: Ejection Fraction

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
EF determined (%)	1467 (93.7)	884 (90.8)	583 (98.6)	<0.001
EF (range) (%)				<0.001
Normal (55-65%)	560 (38.4)	438 (49.8)	122 (21.1)	
Preserved (50-54%)	178 (12.2)	105 (11.9)	73 (12.6)	
Mild (40-49%)	411 (28.2)	200 (22.8)	211 (36.4)	
Moderate (30-39%)	223 (15.3)	97 (11.0)	126 (21.8)	
Severe (< 30%)	86 (5.9)	39 (4.4)	47 (8.1)	

Note:

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

1.10 In-Hospital Complications

Cardiogenic shock, CHF mild-moderate, Stent thrombosis (definite/probable/possible), ventricular fibrillation (VF) were more frequent in patients with STEMI.

Table 1.26: In-Hospital Complications

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
CHF mild-moderate (Killip-2) (%)	168 (10.3)	84 (8.2)	84 (13.9)	<0.001
Pulmonary edema (Killip-3) (%)	63 (3.9)	35 (3.4)	28 (4.6)	0.271
Cardiogenic shock (Killip-4) (%)	40 (2.4)	12 (1.2)	28 (4.6)	<0.001
Hemodynamically significant RV infarction (%)	6 (0.4)	3 (0.3)	3 (0.5)	0.815
Re-MI (%)	12 (0.7)	8 (0.8)	4 (0.7)	1.000
Post MI angina/re-ischemia (%)	21 (1.3)	15 (1.5)	6 (1.0)	0.560
Stent thrombosis (definite/probable/possible) (%)	10 (0.6)	3 (0.3)	7 (1.2)	0.067
Free wall rupture (%)	3 (0.2)	1 (0.1)	2 (0.3)	0.643
Tamponade (%)	1 (0.1)	1 (0.1)	0 (0.0)	1.000
MR Moderate-severe (%)	25 (1.5)	11 (1.1)	14 (2.3)	0.077
Pericarditis (%)	12 (0.7)	5 (0.5)	7 (1.1)	0.219
Sustained VT (>125 bpm) (%)	15 (0.9)	8 (0.8)	7 (1.2)	0.613
VF (%)	33 (2.0)	7 (0.7)	26 (4.3)	<0.001
New AF (%)	56 (3.4)	35 (3.4)	21 (3.4)	1.000
High degree (2nd / 3rd) AVB (%)	19 (1.2)	8 (0.8)	11 (1.8)	0.099
Asystole (%)	11 (0.7)	6 (0.6)	5 (0.8)	0.792
TIA (%)	4 (0.2)	2 (0.2)	2 (0.3)	0.985
Stroke (%)	5 (0.3)	3 (0.3)	2 (0.3)	1.000
CVA/TIA in hospital (%)	9 (0.5)	5 (0.5)	4 (0.7)	0.912
Acute renal injury (%)	66 (4.3)	42 (4.4)	24 (4.1)	0.883
Sepsis (%)	26 (1.7)	14 (1.5)	12 (2.1)	0.513
Bleeding (%)	11 (0.7)	7 (0.7)	4 (0.7)	1.000
Minor bleeding (%)	9 (0.6)	5 (0.5)	4 (0.7)	0.965
Blood transfusions (%)	6 (0.4)	5 (0.5)	1 (0.2)	0.506

1.11 In-Hospital Medical Treatment

Aspirin, P2Y12 inhibitors, Prasugrel, Ticagrelor, Oral anticoagulants, ACE-I, Beta-Blockers, Digoxin, CCB, NSAIDS, Statins, Ezetimibe and Antihyperglycemic (only among diabetic patients) were more frequently used in patients with STEMI. Clopidogrel was 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	1644	1034	609	
Anti-platelets				
Aspirin (%)	1284 (92.0)	782 (90.1)	502 (95.1)	0.001
P2Y12 inhibitors (%)	1130 (81.0)	647 (74.5)	483 (91.7)	<0.001
Clopidogrel (%)	369 (26.4)	287 (33.1)	82 (15.5)	<0.001
Prasugrel (%)	447 (32.0)	174 (20.0)	273 (51.7)	<0.001
Ticagrelor (%)	345 (24.7)	201 (23.2)	144 (27.3)	0.096
Anticoagulants				
Oral anticoagulants ¹ (%)	93 (6.7)	49 (5.6)	44 (8.3)	0.065
Warfarin (%)	12 (0.9)	8 (0.9)	4 (0.8)	0.982
Dabigatran (%)	0 (0.0)	0 (0.0)	0 (0.0)	NA
Rivaroxaban (%)	10 (0.7)	4 (0.5)	6 (1.1)	0.261
Apixaban (%)	74 (5.3)	39 (4.5)	35 (6.6)	0.109
Other				
ACE-I (%)	827 (78.8)	689 (76.6)	138 (92.6)	<0.001
ARB (%)	34 (3.3)	31 (3.5)	3 (2.0)	0.513
Spironolactone (%)	198 (14.2)	127 (14.6)	71 (13.4)	0.592
Beta Blockers (%)	715 (51.2)	378 (43.5)	337 (63.8)	<0.001
Digoxin (%)	200 (14.3)	90 (10.4)	110 (20.8)	<0.001
CCB (%)	720 (51.6)	375 (43.2)	345 (65.3)	<0.001
Amiodarone (%)	6 (0.4)	3 (0.3)	3 (0.6)	0.846
Other Anti-Arrhythmic (%)	134 (9.6)	93 (10.7)	41 (7.8)	0.085
Nitrates (%)	44 (3.2)	24 (2.8)	20 (3.8)	0.367
Diuretics (%)	5 (0.4)	2 (0.2)	3 (0.6)	0.574
Proton-Pump Inhibitors (PPI) (%)	69 (4.9)	49 (5.6)	20 (3.8)	0.154
H2 Blockers (%)	176 (12.6)	114 (13.1)	62 (11.7)	0.499
NSAIDS (%)	759 (54.4)	423 (48.7)	336 (63.6)	<0.001
Colchicine (%)	20 (1.4)	15 (1.7)	5 (0.9)	0.338
Steroids (%)	26 (1.9)	17 (2.0)	9 (1.7)	0.892
IV inotropic agent (%)	3 (1.2)	1 (0.6)	2 (2.2)	0.592
Antihyperglycemic ² (%)	149 (23.7)	88 (20.4)	61 (30.8)	0.006
Statins (%)	958 (68.6)	540 (62.2)	418 (79.2)	<0.001
Ezetimibe (%)	346 (24.8)	184 (21.2)	162 (30.7)	<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	1644	1034	609
No. of days in ICCU/Cardiology (median [IQR])	17 [13 , 23]	13 [2 , 22.25]	17 [13 , 23]
Total hospital days (median [IQR])	20 [13 , 27]	20 [13 , 27]	20 [13 , 27]

1.13 Discharge

1.13.1 Medical Treatment on Discharge

Aspirin, P2Y12 inhibitors (mainly prasugrel), ACE-I, Spironolactone, beta-blockers, statins and ezetimibe were more often prescribed for patients with STEMI and Antihyperglycemic, Glucagon-Like Peptide-1 receptor agonists (GLP1-RA) were more often prescribed among diabetic STEMI patients.

Clopidogrel, CCB, nitrates, diuretics and PPI 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	1621	1023	598	
Anti-platelets				
Aspirin (%)	1217 (88.1)	743 (86.3)	474 (91.2)	0.009
P2Y12 inhibitors (%)	1180 (85.4)	695 (80.7)	485 (93.3)	<0.001
Clopidogrel (%)	376 (27.2)	301 (35.0)	75 (14.4)	<0.001
Prasugrel (%)	466 (33.7)	191 (22.2)	275 (52.9)	<0.001
Ticagrelor (%)	338 (24.5)	202 (23.5)	136 (26.2)	0.288
Anticoagulants				
Oral anticoagulants ¹ (%)	121 (8.8)	76 (8.8)	45 (8.7)	0.990
Warfarin (%)	6 (0.4)	4 (0.5)	2 (0.4)	1.000
Dabigatran (%)	0 (0.0)	0 (0.0)	0 (0.0)	NA
Rivaroxaban (%)	11 (0.8)	6 (0.7)	5 (1.0)	0.823
Apixaban (%)	104 (7.5)	66 (7.7)	38 (7.3)	0.890
Other				
ACE-I (%)	686 (49.7)	380 (44.1)	306 (58.8)	<0.001
ARB (%)	307 (22.2)	205 (23.8)	102 (19.6)	0.080
Spironolactone (%)	225 (16.3)	108 (12.5)	117 (22.5)	<0.001
Beta Blockers (%)	964 (69.8)	559 (64.9)	405 (77.9)	<0.001
Digoxin (%)	6 (0.4)	3 (0.3)	3 (0.6)	0.839
CCB (%)	233 (16.9)	173 (20.1)	60 (11.5)	<0.001
Amiodarone (%)	45 (3.3)	29 (3.4)	16 (3.1)	0.889
Other Anti-Arrhythmic (%)	5 (0.4)	3 (0.3)	2 (0.4)	1.000
Nitrates (%)	42 (3.0)	34 (3.9)	8 (1.5)	0.018
Diuretics (%)	210 (15.2)	151 (17.5)	59 (11.3)	0.002
PPI (%)	974 (70.5)	586 (68.1)	388 (74.6)	0.011
H2 Blockers (%)	23 (1.7)	18 (2.1)	5 (1.0)	0.170
Colchicine (%)	30 (2.2)	16 (1.9)	14 (2.7)	0.401
Steroids (%)	5 (2.0)	3 (1.8)	2 (2.3)	1.000
Antihyperglycemic ² (%)	267 (42.9)	177 (41.4)	90 (46.2)	0.301
Glucagon-Like Peptide-1 receptor agonists (GLP1-RA) ² (%)	35 (5.8)	18 (4.3)	17 (9.2)	0.026
Sodium-Glucose Cotransporter-2 (SGLT2) Inhibitors ² (%)	284 (20.6)	175 (20.3)	109 (21.0)	0.830
Statins (%)	1303 (94.4)	805 (93.5)	498 (95.8)	0.098
Ezetimibe (%)	460 (33.3)	267 (31.0)	193 (37.1)	0.023

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	1621	1023	598
Discharged to:			
Home	1441 (89.0)	913 (89.2)	528 (88.4)
Internal medicine	62 (3.8)	33 (3.2)	29 (4.9)
Cardiothoracic surgery	64 (4.0)	50 (4.9)	14 (2.3)
Other hospital	27 (1.7)	18 (1.8)	9 (1.5)
Other ward	19 (1.2)	6 (0.6)	13 (2.2)
Nursing home	7 (0.4)	3 (0.3)	4 (0.7)

1.14 Mortality and Major Adverse Cardiac Event (MACE)

1.14.1 Rates of Mortality and MACE by discharge diagnosis

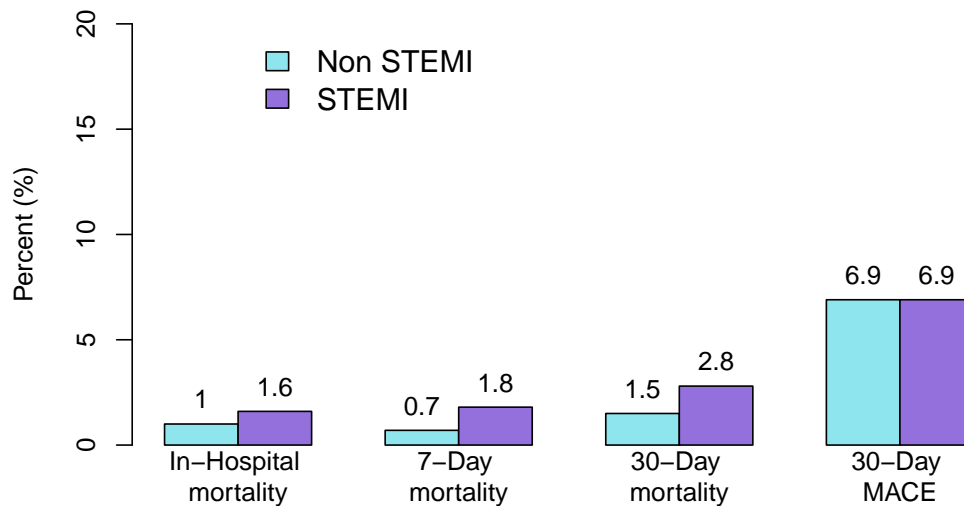
7-days mortality was significantly higher for patients with STEMI compared to those with non STEMI. MACE (Major Adverse Cardiac Events), which included recurrent MI or UAP, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up) or death occurring within 30 days from 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 MACE¹

	Total	Non STEMI	STEMI	p-value
n	1644	1034	609	
In-hospital mortality (%)	20 (1.2)	10 (1.0)	10 (1.6)	0.330
7-day mortality (%)	16 (1.1)	6 (0.7)	10 (1.8)	0.088
30-day mortality (%)	29 (2.0)	13 (1.5)	16 (2.8)	0.102
MACE ¹ (%)	101 (6.9)	62 (6.9)	39 (6.9)	1.000

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 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	1.87 (0.76,4.62)	3.19 (0.8,14.6)
7-Days	2.82 (1.03,8.41)	5.85 (1.4,31.99)
30-Days	2.26 (1.07,4.88)	4.26 (1.57,12.78)
MACE ²	1.06 (0.69,1.6)	1.24 (0.74,2.08)

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	1644	308	1335	
In-hospital mortality (%)	20 (1.2)	4 (1.3)	16 (1.2)	1.000
7-day mortality (%)	16 (1.1)	3 (1.1)	13 (1.1)	1.000
30-day mortality (%)	29 (2.0)	4 (1.5)	25 (2.1)	0.688
MACE ¹ (%)	101 (6.9)	24 (8.9)	77 (6.4)	0.197

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	0.95 (0.27,2.69)	0.83 (0.11,3.86)
7-Days mortality	0.96 (0.22,3.12)	0.87 (0.12,3.94)
30-Days mortality	0.56 (0.16,1.49)	0.28 (0.04,1.09)
MACE ²	1.3 (0.78,2.09)	1.22 (0.66,2.17)

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.

1.15 Re-Hospitalization within 90 Days of Admission

Re-hospitalization rates for patients with STEMI and non STEMI were similar. Differences in reasons for re-hospitalization were not statistically significant.

Table 1.34: Re-Hospitalization within 90 Days of Admission

	Total	Non STEMI	STEMI	p-value
All patients				
n	1621	1023	598	
Re-hospitalization ¹ (%)	415 (27.5)	252 (26.8)	163 (28.6)	0.459
Re-hospitalized patients only				
n	415	252	163	
Scheduled (%)	193 (46.8)	106 (42.4)	87 (53.7)	0.032
Scheduled due to cardiac reason (%)	186 (97.9)	102 (96.2)	84 (100.0)	0.197
Non-Scheduled (%)	219 (53.2)	144 (57.6)	75 (46.3)	0.032
Non-Scheduled due to cardiac reason (%)	116 (53.0)	78 (54.2)	38 (50.7)	0.726

¹ Re-hospitalization among hospital survivors

1.16 Detailed 90-Day Follow-Up Clinical Data

This is the second time we performed 90 days follow up survey. We performed this survey in order to evaluate patient's adherence to treatment and life-style changes recommendations.

Ninety-day follow-up were performed for 1527 (93%) patients. Of which 773 (51%) were contacted by phone, 113 (7%) by clinical visits Most of the patients were asymptomatic and in NYHA Class I.

Very few patients were treated with angiotensin receptor-neprilysin inhibitors (ARNI'S) or SGLT-2i (non-diabetic). Most of the patients were receiving potent statins and only 1% were on PCSK-9i. For diabetic patients, 35% of patients were receiving SGLT-2 but very few patients were on GLP1-RA.

Table 1.35: Medical Treatment at 90-Day Follow-Up

	Overall
n	1527
Aspirin (%)	1038 (87.6)
Clopidogrel (%)	340 (28.7)
Prasugrel (%)	416 (35.1)
Ticagrelor (%)	288 (24.3)
Apixaban (%)	102 (8.6)
Dabigatran (%)	1184 (100.0)
Rivaroxaban (%)	8 (0.7)
Warfarin (%)	6 (0.5)
Enoxaparin (%)	13 (1.1)
ACE-I (%)	568 (48.0)
ARB's (%)	280 (23.6)
ARNI (%)	31 (2.6)
Spironolactone (%)	199 (16.8)
Beta blockers (%)	841 (71.0)
Digoxin (%)	5 (0.4)
CCB (%)	197 (16.6)
Diuretics (%)	178 (15.0)
PPI's (%)	853 (71.9)
Dapagliflozin (Forxiga) for non diabetic (%)	38 (5.7)
Empagliflozin (Jardiance) for non diabetic (%)	46 (6.9)

¹ Statins include: Simvastatin, Pravastatin, Atorvastatin, Rosuvastatin

Table 1.36: Diabetes Medications in 90-Day Follow-Up

	Overall
n	700
Insulin SC (%)	149 (28.8)
Glibenclamide (Gluben) (%)	1 (0.2)
Glipizide (Gluco-Rite) (%)	517 (100.0)
Glimepiride (Amaryl) (%)	4 (0.8)
Metformin (Glucophage) (%)	151 (29.2)
Sitagliptine (Januvia) (%)	19 (3.7)
Saxagliptine (Onglyza) (%)	517 (100.0)
Vidagliptine (Galvus) (%)	5 (1.0)
Linagliptine (Trajenta) (%)	4 (0.8)
Exenatide (Byetta, Budyreon) (%)	517 (100.0)
Liraglutide (Victoza) (%)	5 (1.0)
Dulaglutide (Trulicity) (%)	36 (7.0)
Semaglutide (Ozempic) (%)	30 (5.8)
Dapagliflozin (Forxiga) (%)	66 (12.8)
Empagliflozin (Jardiance) (%)	147 (28.4)
Acrabose (Prandase) (%)	517 (100.0)
Meglinptides (Repaglinide, Novonorm) (%)	5 (1.0)
TZDs (Pioglitazone - actos, Rosiglitazone - Avandia) (%)	4 (0.8)

Concerning life-style modification, 23% of patients reported to perform regular weekly exercise and 31% patients reported about diet change. Smoking cessation was reported in 217 (38%) of the patients who were active smokers during the index hospitalization.

Despite the recommendation for cardiac rehabilitation programs, only 37% of patients were actively participating or scheduled.

Chapter 2: Temporal Trends 2010-2024

Temporal Trends in Characteristics, Management, and Outcome of Patients with ACS in Cardiology: 2010-2024

2.1 Patients' Characteristics

Table 2.1: Patients' Characteristics

	2010	2013	2016	2018	2021	2024	p for trend
n	1779	1885	1791	1778	1750	1755	
Gender (Male)	1378	1453	1414	1427	1391	1431	<0.001
(%)	(77.5)	(77.1)	(79.0)	(80.3)	(79.5)	(81.6)	
Age (%)							0.01
≤ 50	272 (15.3)	297 (15.8)	246 (13.7)	260 (14.6)	244 (13.9)	233 (13.3)	
50-75	1158	1195	1162	1158	1200	1171	
(%)	(65.1)	(63.4)	(64.9)	(65.2)	(68.6)	(66.7)	
> 75	349 (19.6)	393 (20.8)	382 (21.3)	357 (20.1)	306 (17.5)	351 (20.0)	
Age (mean	63.64	63.97	64.67	64.28	64.20	64.81	0.011
(sd))	(12.67)	(12.91)	(12.82)	(12.69)	(12.31)	(12.11)	

2.2 Cardiovascular (CV) History and Risk Factors

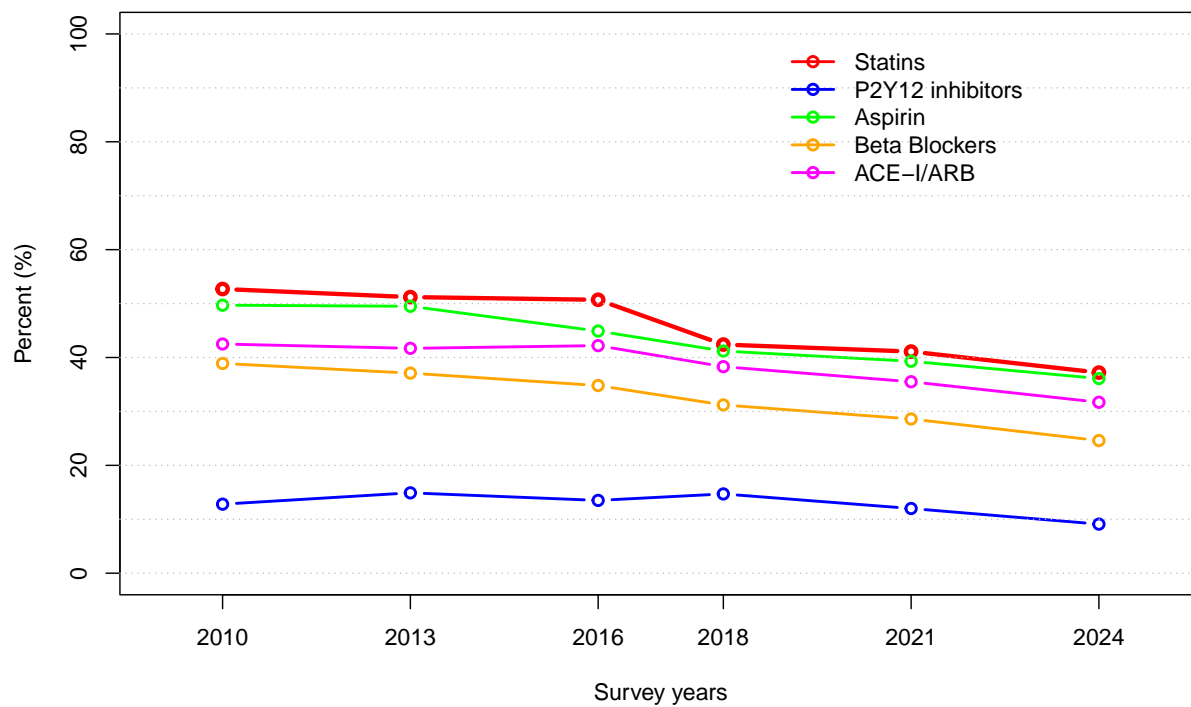
Table 2.2.a: Cardiovascular History and Risk Factors

	2010	2013	2016	2018	2021	2024	p for trend
n	1779	1885	1791	1778	1750	1755	
CV history							
MI (%)	32.0	30.4	37.2	38.8	37.3	37.2	<0.001
Prior PCI (%)	33.8	34.2	33.4	35.2	34.9	36.1	0.104
CABG (%)	10.0	9.1	8.8	9.1	7.3	5.7	<0.001
CHF (%)	8.5	7.9	6.7	10.4	7.1	8.8	0.577
Stroke/TIA (%)	8.2	8.4	8.2	9.2	8.8	9.1	0.196
Chronic renal failure (%)	12.0	12.6	11.4	11.4	10.5	10.4	0.024
Peripheral Vascular Disease (PVD) (%)	8.2	7.1	6.0	7.8	7.3	5.8	0.073
Risk factors							
Hypertension (%)	66.0	66.1	64.7	67.3	63.4	65.6	0.403
Diabetes (%)	38.0	39.1	41.5	41.8	42.4	43.2	<0.001
Dyslipidemia (%)	75.3	75.9	72.7	71.0	70.4	76.2	0.096
Current smoker (%)	38.4	39.3	38.5	43.0	41.3	39.0	0.152
Past smoker (%)	24.7	20.6	21.1	18.7	18.9	17.7	<0.001
Family History of CAD (%)	31.2	28.8	33.4	34.0	28.9	30.3	0.806

Table 2.2.b: Prior Chronic Treatment

	2010	2013	2016	2018	2021	2024	p for trend
n	1779	1885	1791	1778	1750	1755	
Aspirin (%)	49.7	49.5	44.9	41.2	39.3	36.1	<0.001
P2Y12 inhibitors (%)	12.8	14.9	13.5	14.7	12.0	9.1	<0.001
Clopidogrel (%)	25.2	22.9	16.4	16.6	10.5	4.2	<0.001
Prasugrel (%)	0.0	1.0	1.3	1.1	1.5	1.5	<0.001
Ticagrelor (%)	0.0	0.5	1.5	3.0	1.7	1.8	<0.001
Beta Blockers (%)	38.9	37.1	34.8	31.2	28.6	24.6	<0.001
ACE-I/ARB (%)	42.5	41.7	42.2	38.3	35.5	31.7	<0.001
Statins (%)	52.7	51.2	50.7	42.4	41.1	37.2	<0.001
Lipid Lowering Drugs (LLDs) (%)	53.5	51.8	50.7	43.0	41.5	37.4	<0.001
Digoxin (%)	0.7	0.7	0.3	0.2	0.2	18.8	<0.001
Diuretic (%)	18.4	15.6	13.5	10.7	6.6	6.4	<0.001
Nitrates (%)	7.8	5.5	3.7	3.5	1.1	1.3	<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	2024
n	1779	1885	1791	1778	1750	1755
Ward (%)						
Cardiology/ICCU	89.0	84.8	86.8	86.4	88.3	91.0
Internal Medicine	9.4	13.5	12.3	12.4	10.5	0.0
internal Medicine	0.0	0.0	0.0	0.0	0.0	8.3
Ward						
Other	1.5	1.8	0.9	1.1	1.2	0.7

p for trend 0.272

2.3.2.a ECG on Admission

Table 2.4: ECG on Admission

	2010	2013	2016	2018	2021	2024
n	1779	1885	1791	1778	1750	1755
ST elevation	43.6	39.7	39.8	39.7	40.3	38.8
Non ST elevation	56.4	60.3	60.2	60.3	59.7	61.2

p for trend 0.023

2.3.2.b Diagnosis at Discharge

Table 2.5: Diagnosis at Discharge

	2010	2013	2016	2018	2021	2024
n	1779	1885	1791	1778	1750	1755
Non STEMI	57.3	61.4	60.5	61.2	60.0	62.1
STEMI	42.7	38.6	39.5	38.8	40.0	37.9

p for trend 0.036

2.3.3 Killip Class on Admission

Table 2.6: Killip Class on Admission

	2010	2013	2016	2018	2021	2024
n	1779	1885	1791	1778	1750	1755
Killip class (%)						
1	87.2	87.6	90.5	87.4	85.2	90.5
2	6.7	7.1	5.6	6.8	10.0	6.6
3	4.3	3.3	2.5	3.7	3.0	2.2
4	1.8	1.9	1.4	2.1	1.7	0.7

p for trend 0.02

2.4 Primary Reperfusion Therapy in Patients with ST elevation

Figure 2.2: Primary Reperfusion among Patients with ST elevation

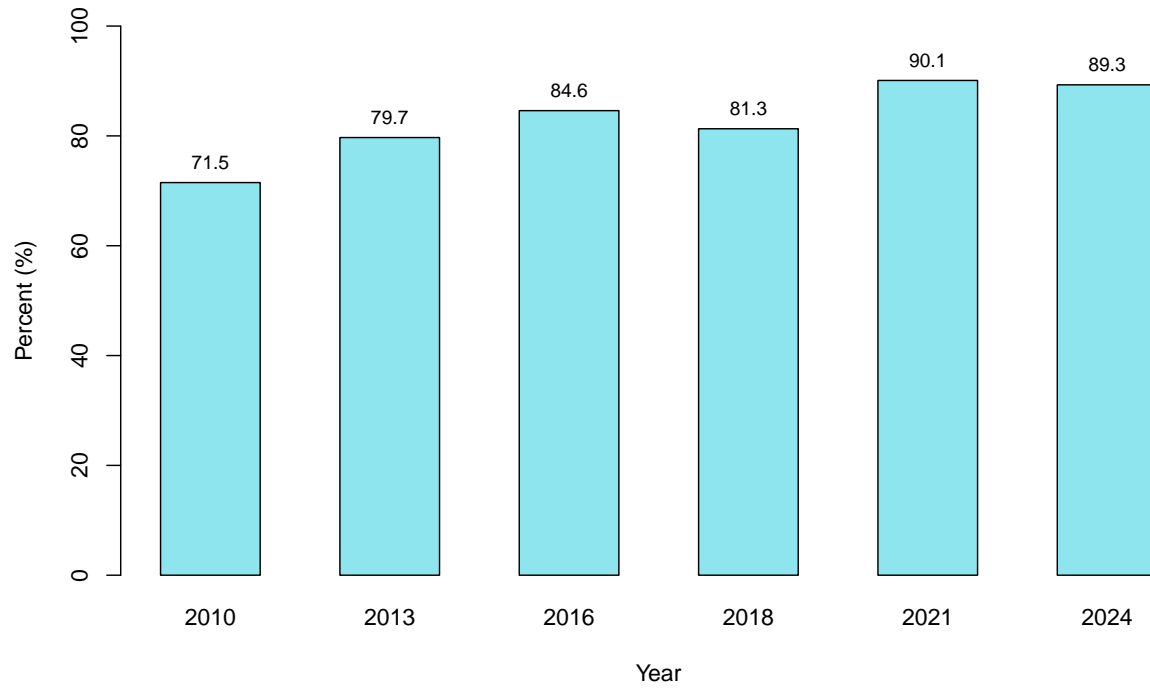
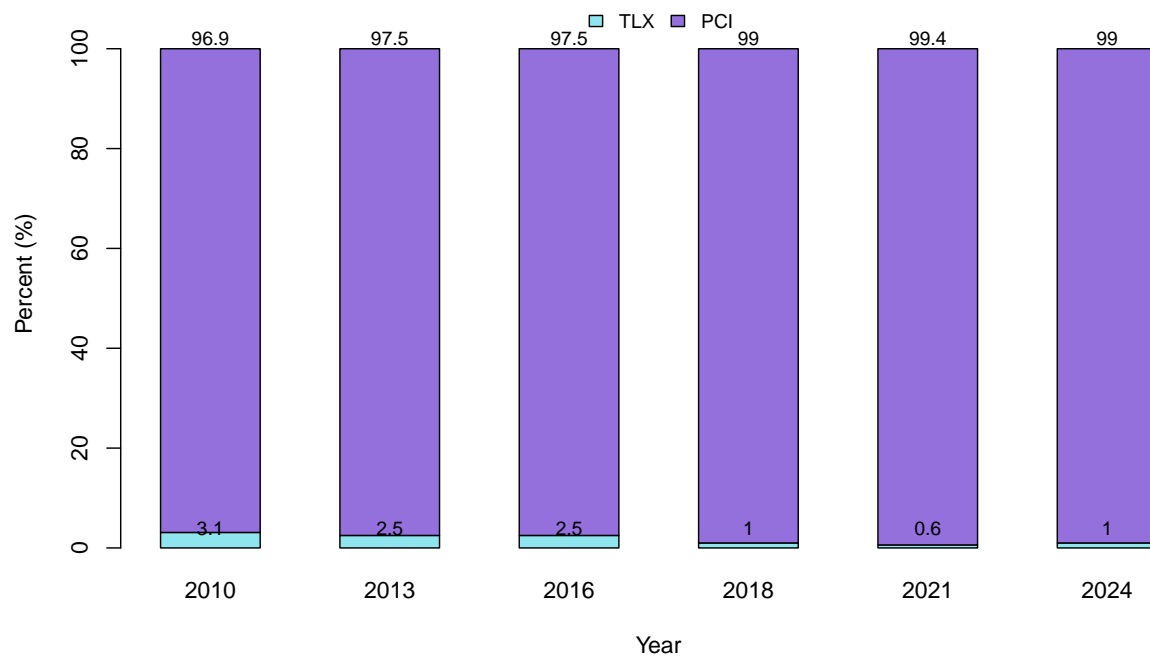


Figure 2.3: Type of Primary Reperfusion among Patients with ST Elevation



2.4.1 Primary PCI / Coronary Angiography

Table 2.7.1: Vascular access during Primary Reperfusion

	2010	2013	2016	2018	2021	2024
n	555	596	603	574	635	598
Vascular access, n (%):						
Femoral	374 (72.3)	225 (39.5)	126 (21.6)	113 (20.2)	89 (14.4)	47 (8.2)
Radial	143 (27.7)	345 (60.5)	449 (76.9)	437 (78.2)	519 (83.8)	521 (91.1)
Both	0 (0.0)	0 (0.0)	9 (1.5)	9 (1.6)	11 (1.8)	4 (0.7)

2.4.2 Coronary angiography (*excluding primary PCI*)

Table 2.7.2: Vascular access during coronary angiography

	2010	2013	2016	2018	2021	2024
n (excluding primary PCI)	1260	1317	1226	1229	1048	1145
Coronary angiography, n (%)	1057 (84.0)	1080 (82.1)	1079 (88.2)	1093 (88.9)	913 (87.2)	1004 (89.6)
Vascular access, n (%):						
Femoral	0 (NaN)	0 (NaN)	176 (16.4)	91 (11.5)	79 (8.8)	49 (5.1)
Radial	0 (NaN)	0 (NaN)	882 (82.0)	679 (85.5)	811 (90.1)	910 (94.3)
Both	0 (NaN)	0 (NaN)	18 (1.7)	24 (3.0)	10 (1.1)	6 (0.6)

2.5 Time Intervals in STEMI Patients

Table 2.8.1: Primary reperfusion among STEMI patients

	2010	2013	2016	2018	2021	2024
n	760	727	708	690	700	665
Primary reperfusion, n (%)	540 (71.1)	573 (78.8)	582 (82.2)	550 (79.7)	635 (90.7)	582 (87.5)

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

	2010	2013	2016	2018	2021	2024	p for trend
n	503	536	544	526	610	539	
Symptom onset to ED 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]	124.00 [75.00, 232.00]	0.005
ED 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]	32.00 [14.50, 65.50]	<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]	173.00 [116.25, 310.00]	0.336
Door to balloon \leq 90 min. (%)	326 (66.9)	345 (70.6)	406 (79.0)	367 (82.3)	456 (82.0)	413 (85.5)	<0.001

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

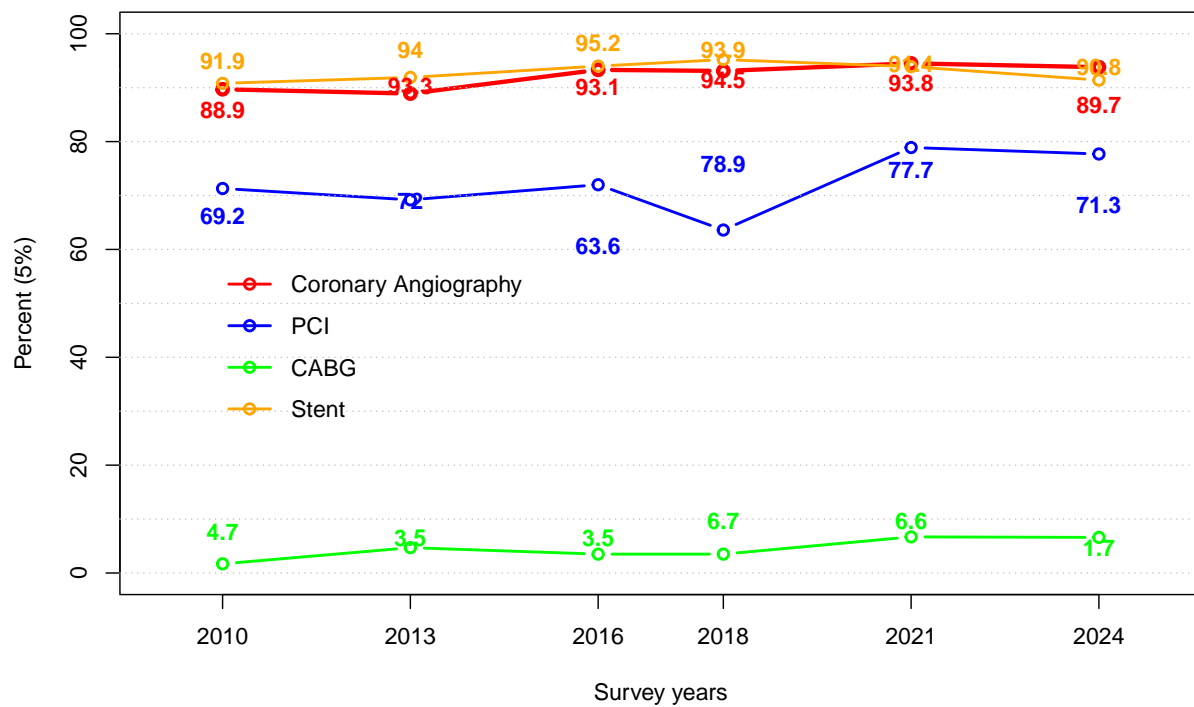
	2010	2013	2016	2018	2021	2024	p for trend
Men							
n	409	449	440	442	501	446	
Symptom onset to ED arrival (median [IQR])	110.00 [66.00, 210.00]	126.00 [70.00, 239.00]	117.00 [65.00, 191.00]	119.50 [70.75, 214.00]	119.50 [68.00, 297.50]	118.00 [75.00, 225.00]	0.016
ED arrival to primary PCI (door to 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]	31.50 [15.00, 66.25]	<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]	170.00 [116.00, 300.00]	0.666
Women							
n	94	87	104	84	109	93	
Symptom onset to ED 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]	172.00 [66.00, 337.50]	0.139
ED 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]	33.00 [13.50, 61.50]	0.002
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]	229.00 [133.00, 420.00]	0.217

2.6 Procedures during Hospitalization

Table 2.10 Procedures during Hospitalization

	2010	2013	2016	2018	2021	2024	p for trend
n	1779	1885	1791	1778	1750	1755	
Coronary Angiography (%)	89.7	88.9	93.3	93.1	94.5	93.8	<0.001
Any PCI (%)	71.3	69.2	72.0	63.6	78.9	77.7	<0.001
Stent (%)	90.8	91.9	94.0	95.2	93.9	91.4	0.101
CABG (%)	1.7	4.7	3.5	3.5	6.7	6.6	<0.001
IABP (%)	4.6	2.3	2.2	2.0	1.9	1.1	<0.001

Figure 2.4: Trends in Procedures Performed During Hospitalization



2.7 In-Hospital Complications

Table 2.11: In-Hospital Complications

	2010	2013	2016	2018	2021	2024	p for trend
n	1779	1885	1791	1778	1750	1755	
Re-MI (%)	1.1	1.0	0.5	0.6	1.1	0.6	0.407
Post MI angina/Re-ischemia (%)	2.0	2.0	1.3	1.2	1.3	1.0	0.003
Sub-Acute Stent Thrombosis (%)	0.6	0.8	0.7	0.3	0.6	0.6	0.694
Mild-moderate CHF (Killip 2) (%)	7.8	6.1	5.9	7.4	8.5	10.3	<0.001
Pulmonary edema (Killip 3) (%)	4.9	4.4	3.1	3.3	3.7	3.4	0.012
Cardiogenic shock (Killip 4) (%)	3.1	3.3	2.0	3.1	3.2	2.5	0.44
Free wall rupture (%)	0.1	0.1	0.2	0.1	0.2	0.2	0.392
Tamponade (%)	0.3	0.0	0.2	0.2	0.4	0.1	0.882
Moderate-severe MR (%)	1.7	2.1	1.1	0.8	1.8	1.4	0.275
Sustained VT (%)	1.3	1.3	1.1	1.1	1.3	0.9	0.381
High degree (2nd / 3rd) AVB (%)	2.1	1.5	1.4	1.5	1.0	1.3	0.016
Primary VF (%)	1.9	1.2	1.3	1.3	1.4	1.2	0.257
Secondary VF (%)	0.6	0.5	0.6	0.5	0.7	0.6	0.709
Asystole (%)	1.9	1.9	1.3	2.0	1.9	0.8	0.058
TIA (%)	0.1	0.2	0.1	0.3	0.2	0.2	0.205
Stroke (%)	0.5	0.6	0.5	0.5	0.3	0.3	0.24
Acute renal injury (%)	6.1	4.6	5.1	4.9	6.7	4.4	0.662
Bleeding (%)	2.4	0.9	1.8	2.8	2.3	0.7	0.294

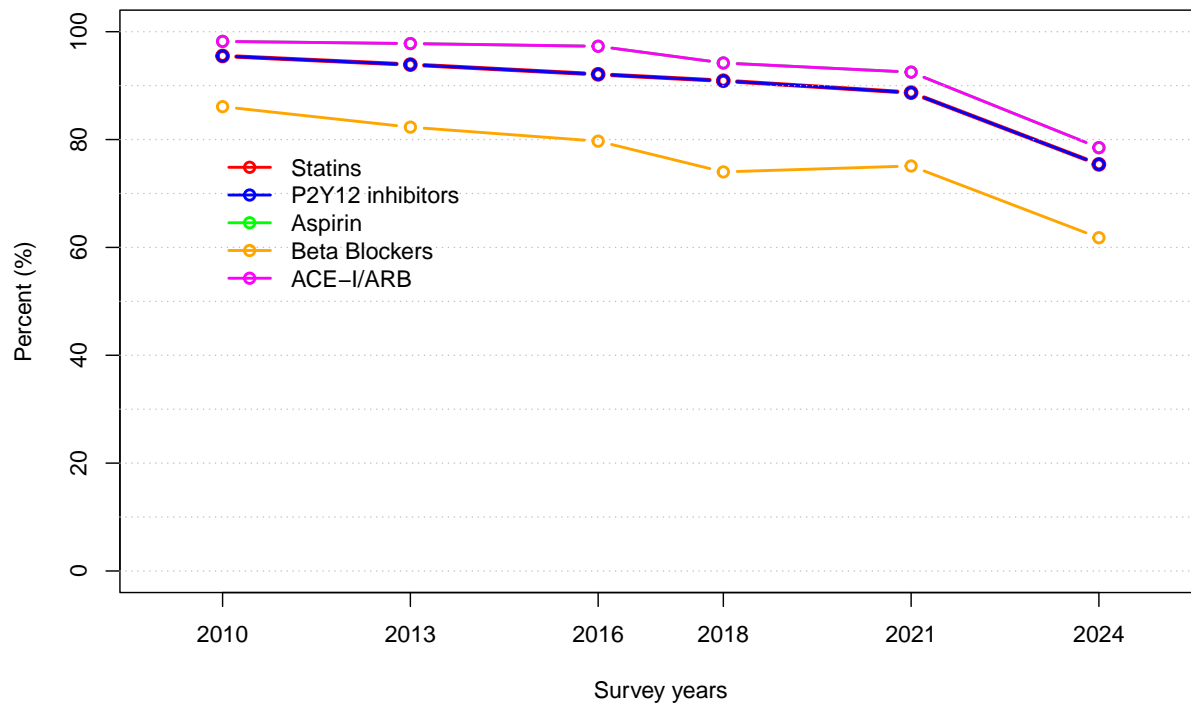
2.8 In-Hospital Treatment

Table 2.12: In-Hospital Treatment

	2010	2013	2016	2018	2021	2024	p for trend
n	1779	1885	1791	1778	1750	1755	
Aspirin (%)	98.2	97.8	97.3	94.2	92.5	78.5	<0.001
P2Y12 inhibitors (%)	95.5	93.9	92.1	90.9	88.7	75.4	<0.001
Clopidogrel (%)	94.9	45.4	31.6	26.7	25.3	22.9	<0.001
Prasugrel (%)	0.3	30.1	25.6	19.5	26.9	29.8	<0.001
Ticagrelor (%)	0.3	18.4	35.0	44.7	36.6	22.7	<0.001
Beta Blockers (%)	86.1	82.3	79.7	74.0	75.1	61.8	<0.001
ACE-I/ARB (%)	98.2	97.8	97.3	94.2	92.5	78.5	<0.001
Statins (%)	95.5	93.9	92.1	90.9	88.7	75.4	<0.001
LLDs (%)	94.9	45.4	31.6	26.7	25.3	22.9	<0.001
Digoxin (%)	0.3	30.1	25.6	19.5	26.9	29.8	<0.001
Diuretic (%)	0.3	18.4	35.0	44.7	36.6	22.7	<0.001
Nitrates (%)	86.1	82.3	79.7	74.0	75.1	61.8	<0.001

¹ Anticoagulants include warfarin, LMWH and DOACs in the years applicable

Figure 2.5: Trends in Hospital Treatment



2.9 Medical Treatment on Discharge

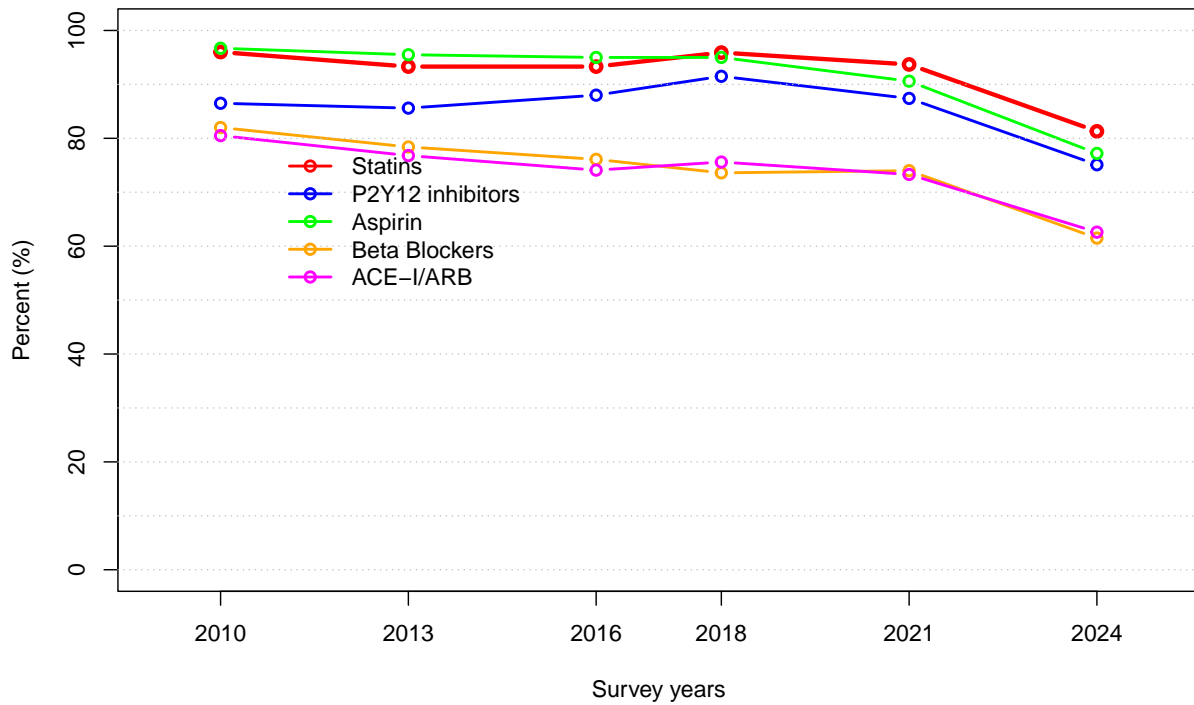
Table 2.13: Medical Treatment on Discharge among Hospital Survivors

	2010	2013	2016	2018	2021	2024	p for trend
n	1741	1848	1761	1726	1709	1705	
Aspirin (%)	96.7	95.5	95.0	95.0	90.6	77.2	<0.001
Beta Blockers (%)	82.0	78.4	76.1	73.6	74.0	61.5	<0.001
P2Y12 inhibitors (%)	86.5	85.6	88.0	91.5	87.4	75.1	<0.001
Clopidogrel (%)	85.9	42.5	31.9	26.4	25.6	22.8	<0.001
Prasugrel (%)	0.3	27.7	24.9	20.0	27.0	30.0	<0.001
Ticagrelor (%)	0.3	15.4	31.2	45.1	34.8	22.3	<0.001
ACE-I/ARB (%)	80.5	76.8	74.1	75.6	73.3	62.6	<0.001
Statins (%)	96.0	93.3	93.3	95.9	93.7	81.3	<0.001
LLDs (%)	96.2	93.5	93.3	94.6	94.6	82.2	<0.001
Digoxin (%)	1.0	0.9	1.1	0.5	0.2	0.3	<0.001
Diuretic (%)	22.5	19.6	18.5	16.5	13.8	13.2	<0.001
Nitrates (%)	6.7	7.6	4.4	5.6	3.3	2.8	<0.001
GLP-1 ¹ (%)	0.0	0.0	0.5	1.0	2.0	2.6	<0.001

¹ Only among diabetic patients

² Anticoagulants include warfarin, LMWH and DOACs 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 MACE¹

	2010	2013	2016	2018	2021	2024	p for trend
n	1779	1885	1791	1778	1750	1755	
Mortality							
In-hospital	2.1	2.0	1.7	2.9	2.2	1.3	0.506
7-day	2.2	1.8	1.6	2.7	1.9	1.5	0.59
30-day	4.2	3.7	3.0	4.3	2.5	2.7	0.012
1 year	8.1	8.3	7.8	8.9	5.4	NaN	0.011
MACE¹							
30-day MACE	10.3	10.4	8.9	8.4	9.8	7.4	0.01

¹ 30 day MACE: Death/UAP/MI/Ischemia/CVA/Stent thrombosis/Follow-up urg. revasc.

Figure 2.7: Rates of Mortality and 30-day MACE

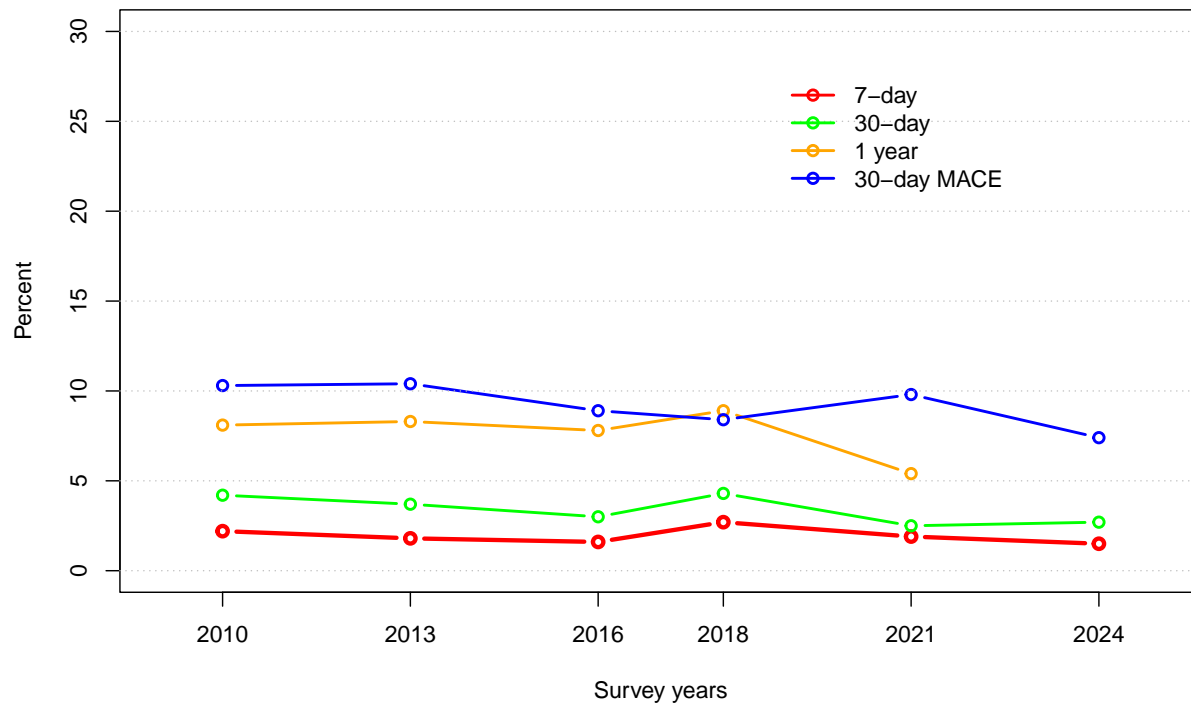


Table 2.15: Rates of Mortality and MACE¹ by Gender

	2010	2013	2016	2018	2021	2024	p for trend
–Men–							
n	1378	1453	1414	1427	1391	1431	
Mortality							
In-hospital	2.0	1.5	1.3	2.5	1.8	1.3	0.579
7-day	1.9	1.3	1.2	2.1	1.7	1.4	0.948
30-day	3.6	2.7	2.2	3.5	2.3	2.7	0.224
1 year	6.9	6.9	6.8	7.2	4.7	NaN	0.042
MACE¹							
30-day	9.2	9.3	7.9	7.3	9.7	6.4	0.085
–Women–							
n	401	432	377	351	359	323	
Mortality							
In-hospital	2.5	3.5	3.2	4.6	3.9	1.6	0.923
7-day	3.2	3.3	2.9	5.1	2.8	1.8	0.572
30-day	6.2	7.0	6.1	7.6	3.3	2.8	0.023
1 year	12.3	12.9	11.6	15.8	8.1	NaN	0.237
MACE¹							
30-day	14.2	14.1	12.7	13.1	10.3	11.4	0.084

¹ 30 day MACE: Death/UAP/MI/Ischemia/CVA/Stent thrombosis/Follow-up urg. revasc.

Figure 2.8: Rates of Mortality and 30-day MACE by gender

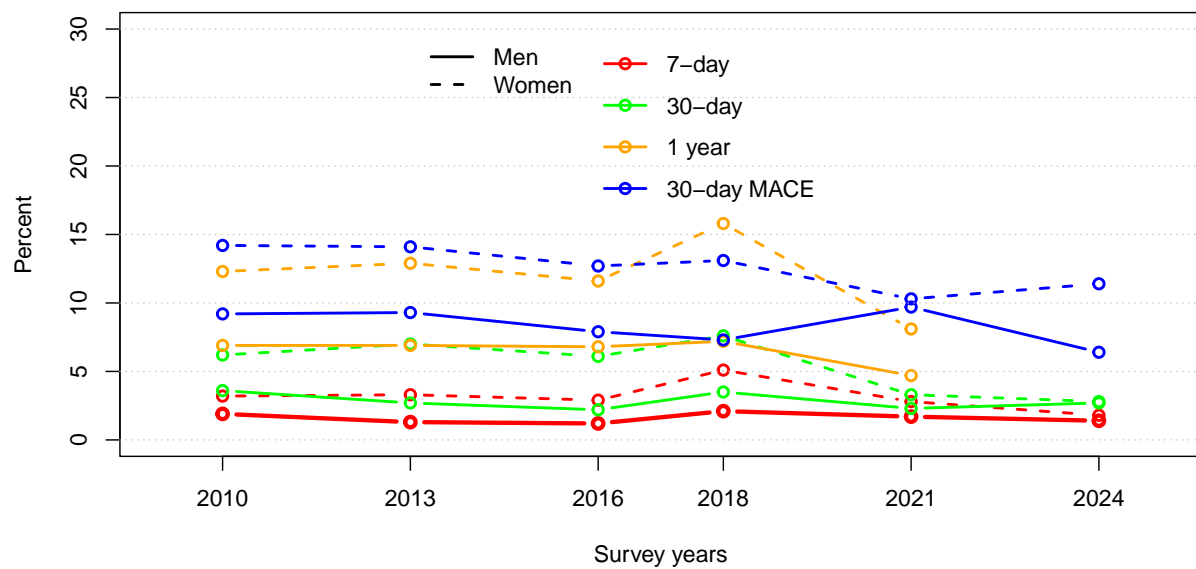


Table 2.16: Rates of Mortality and MACE¹ by Discharge Diagnosis

	2010	2013	2016	2018	2021	2024	p for trend
STEMI							
n	760	727	708	690	700	665	
Mortality							
In-hospital	3.3	3.3	3.1	3.8	3.3	1.8	0.236
7-day	3.6	3.6	3.3	3.6	3.1	2.4	0.297
30-day	5.3	5.0	5.0	5.7	4.0	3.7	0.177
1 year	8.8	8.7	8.1	10.8	5.6	NaN	0.138
MACE¹							
30-day	11.6	12.2	10.9	9.2	8.7	8.1	0.003
Non STEMI							
n	1019	1158	1083	1088	1050	1090	
Mortality							
In-hospital	1.3	1.1	0.7	2.4	1.5	1.0	0.56
7-day	1.2	0.6	0.5	2.1	1.1	0.8	0.495
30-day	3.4	2.9	1.8	3.4	1.5	2.0	0.025
1 year	7.6	8.0	7.6	7.7	5.3	NaN	0.042
MACE¹							
30-day	9.4	9.2	7.6	8.0	10.6	6.8	0.431

¹ 30 day MACE: Death/UAP/MI/Ischemia/CVA/Stent thrombosis/Follow-up urg. revasc.

Figure 2.9: Rates of Mortality and 30-day MACE by Discharge Diagnosis

