ACSIS 2018

Acute Coronary Syndrome Israeli Survey
March-April 2018

SURVEY FINDINGS
AND
TEMPORAL TRENDS

2008 - 2018

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 2018

February 2020

Contents

Introduction

We are proud to present you with the ACSIS 2018 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 2018 was carried out during March-April 2018 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 1778 consecutive ACS patients admitted and diagnosed with ACS.

The ACSIS 2018 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 support of this important survey.

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

Dr. Roy Beigel	Dr. Katia Orvin
Chairman	Secretary

Israeli working-group on Acute Cardiac Care

Message from the Israeli Heart Society

The Israel Heart Society is proud to present the final results of the ACSIS 2018 survey.

ACSIS is a biannual survey conducted over a 2 months period in all coronary care units operating in Israel and includes all ACS patients admitted during the survey period. The survey has been conducted since 2000. Over this long period it has provided invaluable insights into the characteristics, management and outcome of our patients. The survey allows benchmarking for individual centers, has produced numerous scientific papers and allows important analyses of long term trends in ACS.
The 2018 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.

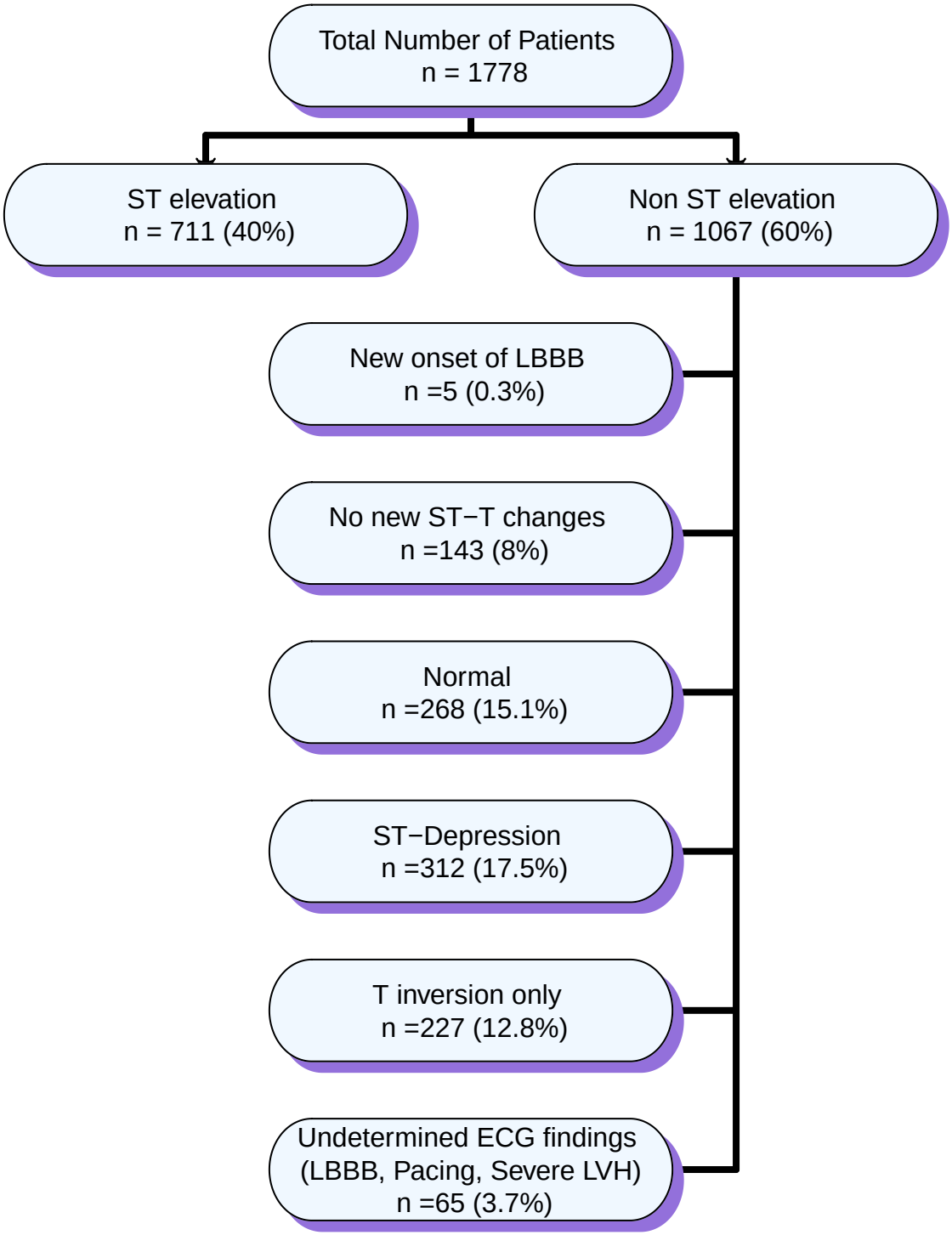
Prof. Doron Zahger	Dr. Arik Wolak
President	Secretary General

The Israel Heart Society

Chapter 1: Acute Coronary Syndrome in Cardiology

1.1 Distribution of Patients with ACS by ECG on Admission

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



1.2 Demographic Characteristics

1.2.1 Age Distribution by ECG on Admission

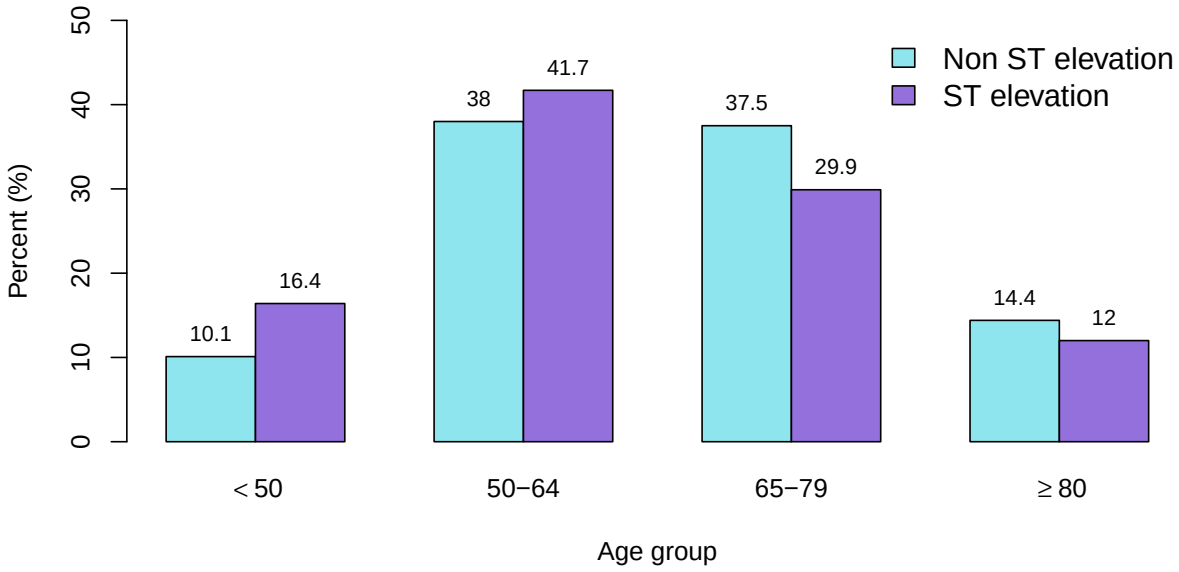
Patients with ST elevation were younger (mean age: 62.5 ± 12.9) than those with non-ST elevation (mean age: 65.5 ± 12.4), and the age distribution of patients with ST elevation indicated a greater proportion of younger patients (58.1% were aged < 65 years) than that of patients with non-ST elevation (48.1% aged < 65 years).

Table 1.1: Age Distribution by ECG on Admission

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Age groups (%)				<0.001
< 50	224 (12.6)	108 (10.1)	116 (16.4)	
50-64	700 (39.4)	405 (38.0)	295 (41.7)	
65-79	612 (34.5)	400 (37.5)	212 (29.9)	
≥ 80	239 (13.5)	154 (14.4)	85 (12.0)	
Age (mean(sd))	64.28 (12.69)	65.46 (12.44)	62.51 (12.86)	<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

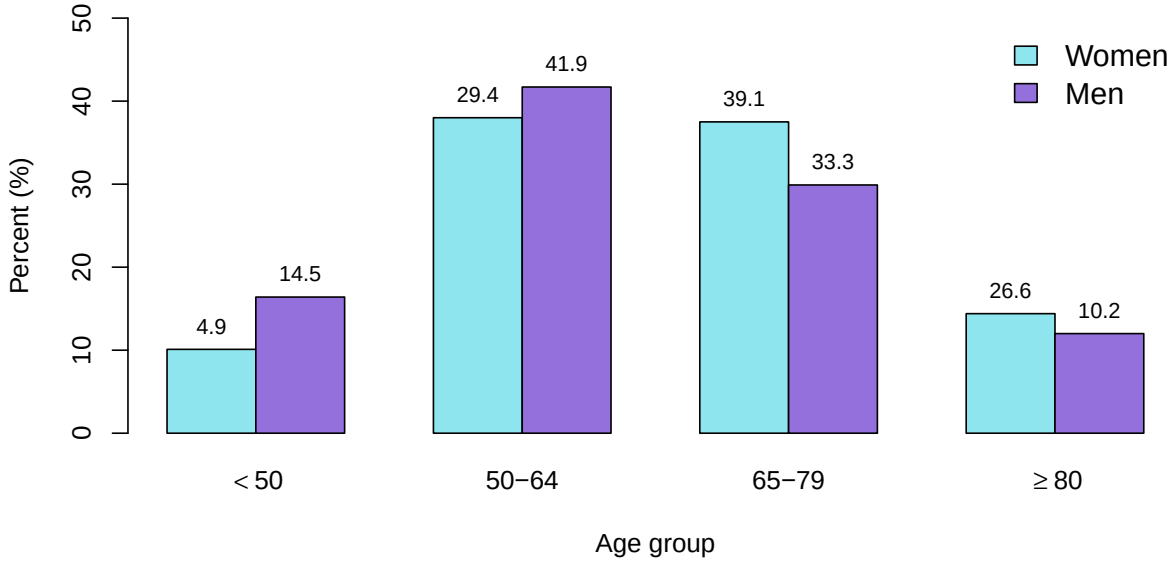
The age distribution of male patients was significantly different from that of female patients. The majority of men (56.4%) were in the younger age groups (< 65) and only 10.2% were aged 80 or above. 14.5% of men were less than 50 years old. By contrast, the majority of the female patients were in the older age groups ≥ 65 (65.7%). The number of women under the age of 50 was significantly less than of their male counterparts (4.9%), and 26.6% were aged 80 or above.

Table 1.2: Age Distribution by Gender

	Total	Women	Men	p-value
n	1778	351	1427	
Age groups (%)				<0.001
< 50	224 (12.6)	17 (4.9)	207 (14.5)	
50-64	700 (39.4)	103 (29.4)	597 (41.9)	
65-79	612 (34.5)	137 (39.1)	475 (33.3)	
≥ 80	239 (13.5)	93 (26.6)	146 (10.2)	
Age (mean(sd))	64.28 (12.69)	70.19 (12.06)	62.83 (12.42)	<0.001

Percentages are calculated out of available data

Figure 1.3: Age Distribution by Gender



1.2.3 Gender Distribution

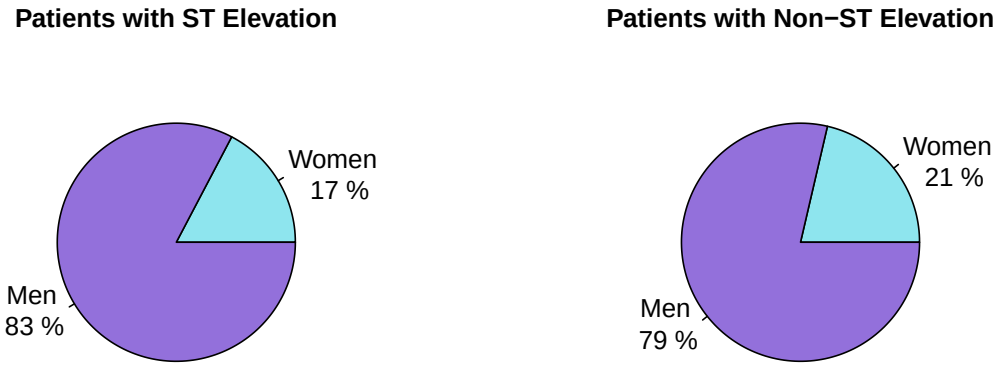
For both ST and non-ST segment elevation ACS we observed clear male predominance.

Table 1.3: Gender Distribution

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Women (%)	351 (19.7)	228 (21.4)	123 (17.3)	0.040
Men (%)	1427 (80.3)	839 (78.6)	588 (82.7)	

Percentages are calculated out of available data

Figure 1.4: Gender Distribution



1.3 Cardiovascular History

1.3.1 Cardiovascular History

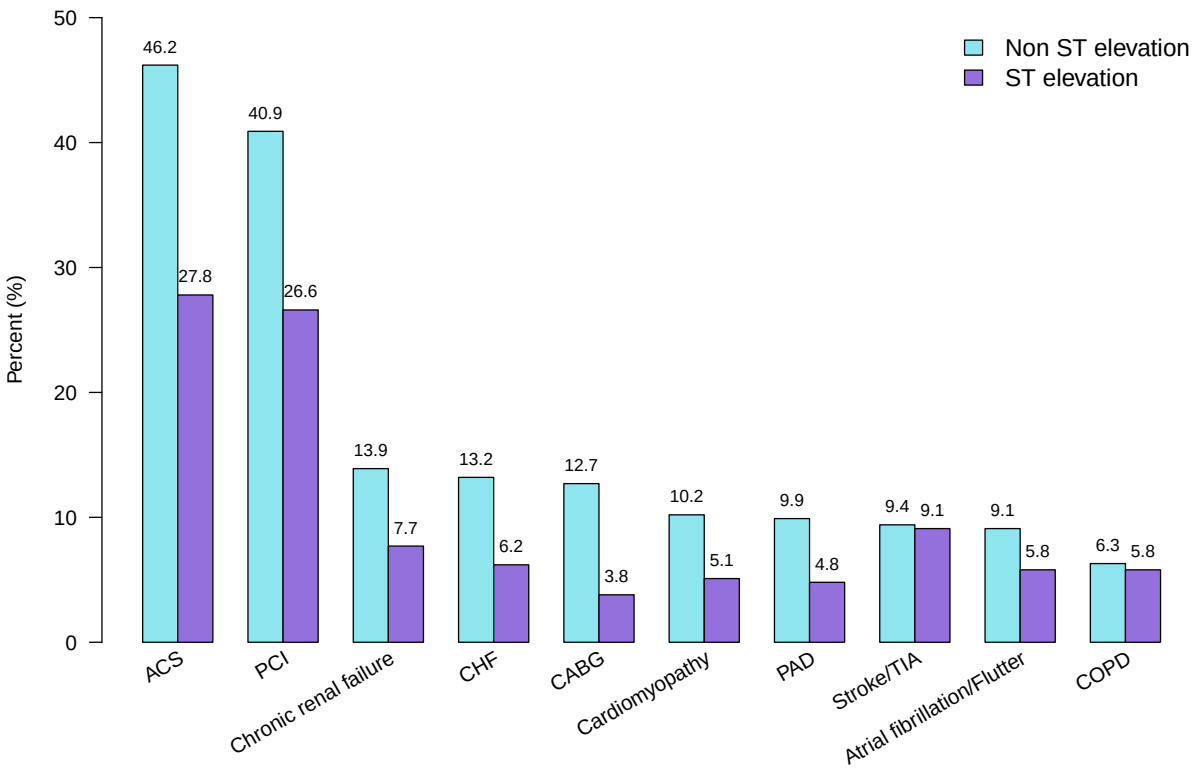
A history of ACS, cardiomyopathy, heart failure (CHF), chronic renal failure, PAD and atrial fibrillation was significantly more frequent among patients with non-ST elevation ACS. Similarly, more patients with non-ST elevation MI had undergone percutaneous interventions (PCI) or coronary artery bypass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

Table 1.4: Prior Cardiovascular History

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
ACS (%)	690 (38.8)	492 (46.2)	198 (27.8)	<0.001
CABG (%)	162 (9.1)	135 (12.7)	27 (3.8)	<0.001
PCI (%)	624 (35.2)	435 (40.9)	189 (26.6)	<0.001
Cardiomyopathy (%)	144 (8.1)	108 (10.2)	36 (5.1)	<0.001
CHF (%)	184 (10.4)	140 (13.2)	44 (6.2)	<0.001
Chronic renal failure (%)	203 (11.4)	148 (13.9)	55 (7.7)	<0.001
PAD (%)	139 (7.8)	105 (9.9)	34 (4.8)	<0.001
Stroke/TIA (%)	164 (9.2)	100 (9.4)	64 (9.1)	0.881
COPD (%)	108 (6.1)	67 (6.3)	41 (5.8)	0.743
Atrial fibrillation/Flutter (%)	138 (7.8)	97 (9.1)	41 (5.8)	0.013
AICD/CRT implant (%)	39 (2.2)	32 (3.1)	7 (1.0)	0.007
Any malignancy (%)	120 (6.9)	75 (7.2)	45 (6.4)	0.611
Thyroid disease (%)	89 (5.3)	56 (5.6)	33 (4.9)	0.606

Percentages are calculated out of available data

Figure 1.5: Cardiovascular history



1.3.2 Risk Factors

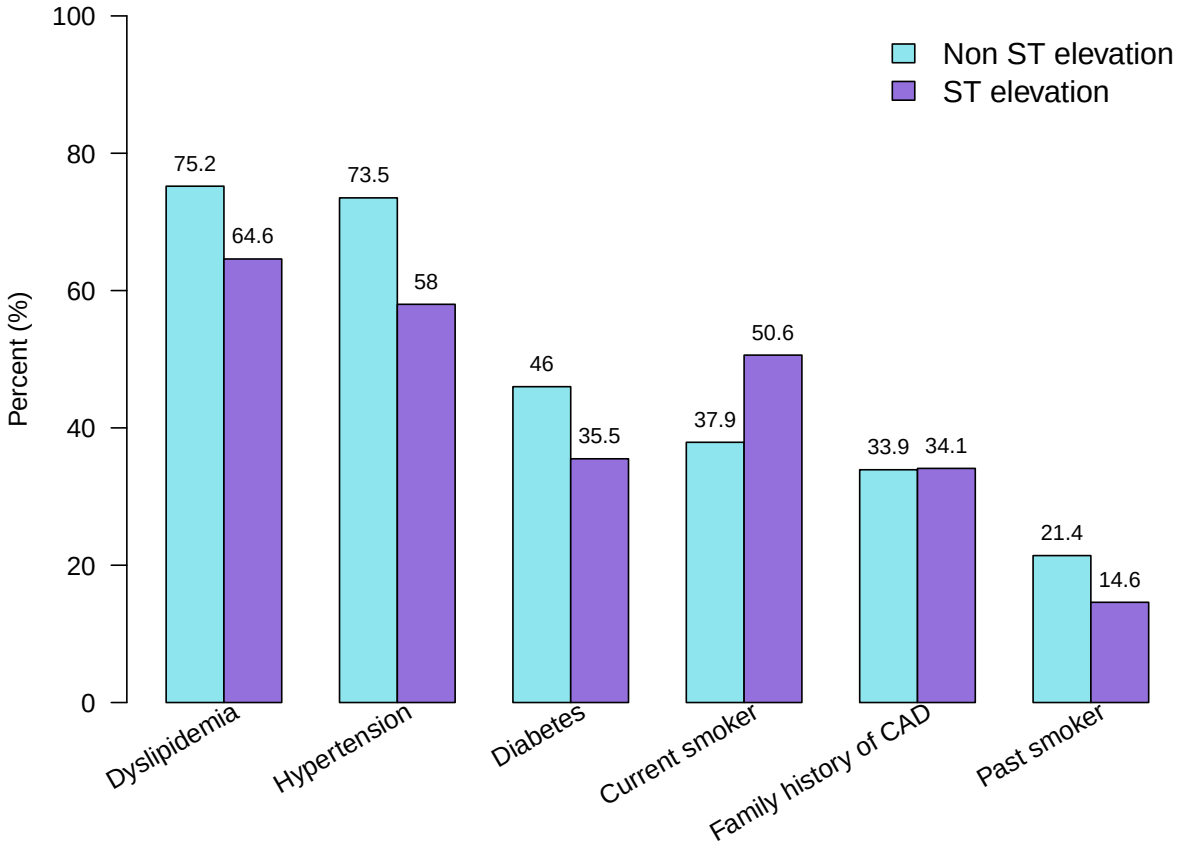
Current smoking was more prevalent among patients presenting with ST-elevation ACS, while other risk factors were generally more prevalent among patients presenting with non-ST elevation ACS. The rates of newly diagnosed hypertension, diabetes and dyslipidemia were higher among those with ST-elevation.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

Table 1.5: Risk Factors

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Hypertension (%)	1194 (67.3)	783 (73.5)	411 (58.0)	<0.001
* Newly diagnosed (%)	63 (5.2)	30 (3.8)	33 (7.9)	0.004
Diabetes (%)	742 (41.8)	490 (46.0)	252 (35.5)	<0.001
* Newly diagnosed (%)	74 (9.8)	41 (8.2)	33 (12.9)	0.049
Dyslipidemia (%)	1259 (71.0)	801 (75.2)	458 (64.6)	<0.001
* Newly diagnosed (%)	84 (6.6)	29 (3.6)	55 (11.9)	<0.001
Current smoker (%)	764 (43.0)	404 (37.9)	360 (50.6)	<0.001
Past smoker (%)	332 (18.7)	228 (21.4)	104 (14.6)	<0.001
Family history of CAD (%)	515 (34.0)	300 (33.9)	215 (34.1)	0.982

Percentages are calculated out of available data
Newly diagnosed expressed as percentage of total patients with specific risk factor

Figure 1.6: Risk Factors



1.4 Prior Chronic Treatment

Prior to the index hospitalization, a higher proportion of patients with a non-ST elevation ACS (57%) were being treated with aspirin compared to those with ST elevation (38.3%). Other drugs in common use were ACE Inhibitors and ARB's, Beta Blockers, lipid-lowering drugs (primarily statins) and diuretics all of which were in use more frequently among patients presenting with non-ST elevation ACS. 19.8% of patients with non-ST elevation and 8.8% of those with ST elevation were being treated with clopidogrel.

Table 1.6: Prior Chronic Treatment

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Anti-platelets				
Aspirin (%)	732 (49.4)	502 (57.0)	230 (38.3)	<0.001
Clopidogrel (%)	190 (15.6)	149 (19.8)	41 (8.8)	<0.001
Prasugrel (%)	19 (1.6)	6 (0.9)	13 (2.6)	0.049
Ticagrelor (%)	53 (4.5)	37 (5.2)	16 (3.4)	0.175
Anticoagulants				
Oral anticoagulants[1](%)	84 (8.2)	63 (10.3)	21 (5.1)	0.005
NOAC (%)	65 (3.7)	49 (4.6)	16 (2.3)	0.014
Warfarin (%)	19 (1.9)	14 (2.4)	5 (1.2)	0.307
Dabigatran (%)	6 (0.6)	5 (0.8)	1 (0.3)	0.456
Rivaroxaban (%)	18 (1.8)	11 (1.9)	7 (1.8)	1.000
Apixaban (%)	41 (4.1)	33 (5.5)	8 (2.0)	0.011
LMWH (%)	11 (1.1)	7 (1.1)	4 (1.0)	1.000
Other				
ACE-I (%)	415 (36.0)	276 (41.6)	139 (28.5)	<0.001
ARB (%)	272 (31.8)	191 (36.5)	81 (24.4)	<0.001
ACE-I/ARB (%)	681 (63.3)	464 (68.7)	217 (54.1)	<0.001
Beta Blockers (%)	555 (44.1)	417 (54.0)	138 (28.3)	<0.001
CCB (%)	315 (35.9)	210 (39.6)	105 (30.3)	0.006
Nitrates (%)	62 (8.1)	54 (11.8)	8 (2.6)	<0.001
Diuretics (%)	191 (22.4)	144 (28.0)	47 (13.9)	<0.001
Antihyperglycemic drugs[3] (%)	443 (84.1)	290 (83.8)	153 (84.5)	0.930
Statins[4] (%)	754 (67.8)	531 (75.2)	223 (54.9)	<0.001
Ezetimibe (%)	67 (9.0)	49 (11.3)	18 (5.8)	0.013

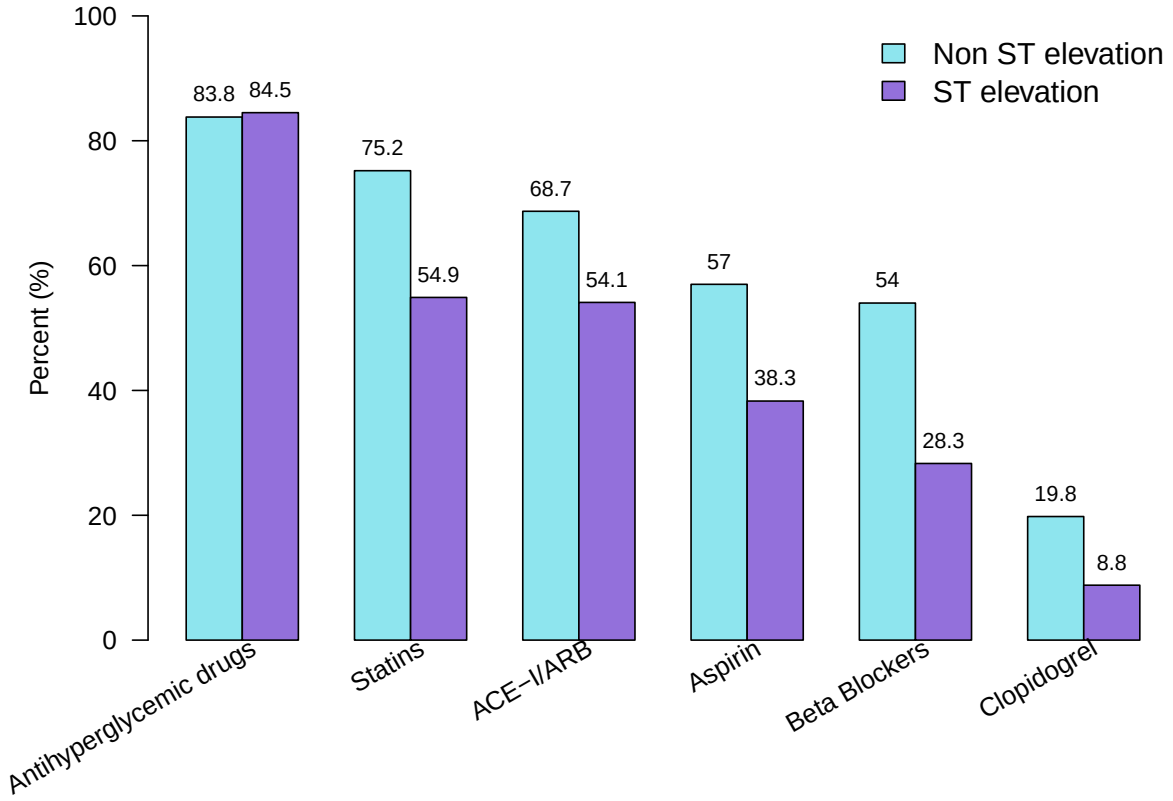
[1] Oral anticoagulants include: Warfarin, Dabigatran, Rivaroxaban, Apixaban

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

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

[*] Percentages are calculated out of available data

Figure 1.7: Prior Chronic Treatment



1.5 Transportation, Pre-Admission and Admission Information

1.5.1 Mode of Transportation by ECG on Admission

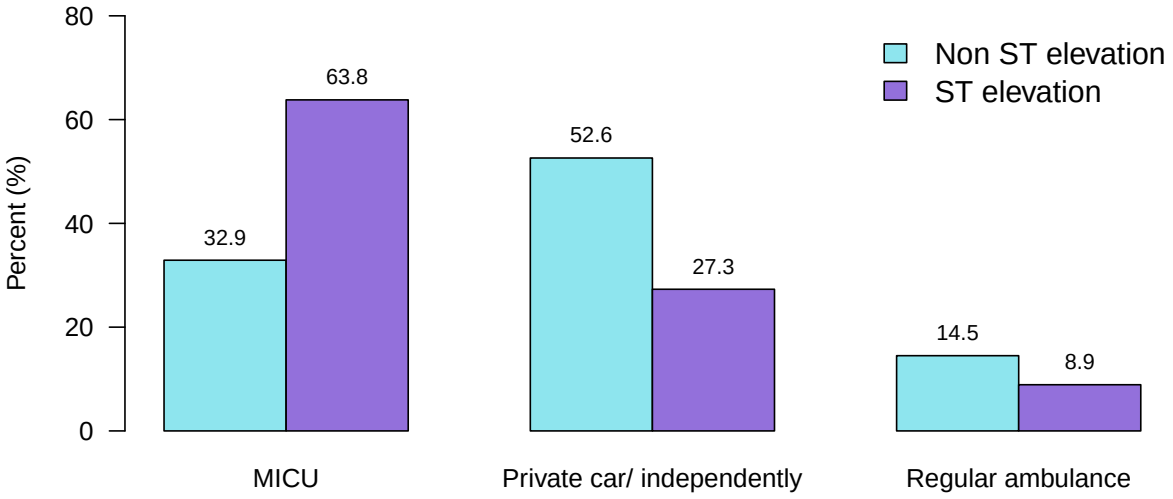
42.3% of all patients arrived at the hospital by means of private transportation. Patients with ST elevation were more frequently transported to hospital with mobile intensive care unit (MICU), and patients with non-ST elevation arrived more frequently by means of private transportation.

Table 1.7: Mode of Transportation by ECG on Admission

	Total	Non ST elevation	ST elevation
n[1]	1670	988	682
MICU (%)	760 (45.5)	325 (32.9)	435 (63.8)
Private car/ independently (%)	706 (42.3)	520 (52.6)	186 (27.3)
Regular ambulance (%)	204 (12.2)	143 (14.5)	61 (8.9)

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

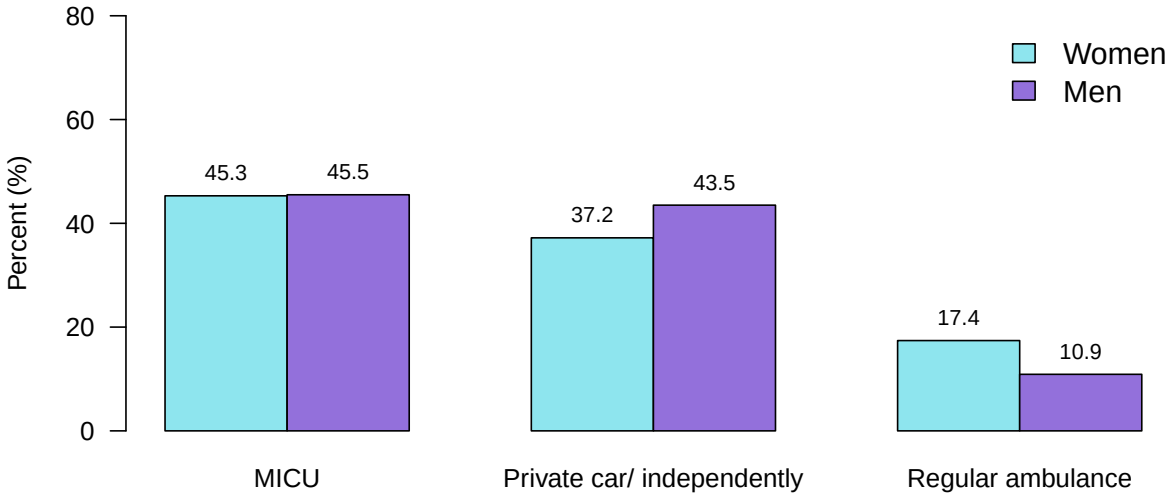
45.5% of patients, both men and women, arrived by means of a MICU. Women were more frequently transported to hospital with regular ambulance and men arrived more frequently by means of private transportation.

Table 1.8: Mode of Transportation by Gender

	Total	Women	Men
n[1]	1670	333	1337
MICU (%)	760 (45.5)	151 (45.3)	609 (45.5)
Private car/ independently (%)	706 (42.3)	124 (37.2)	582 (43.5)
Regular ambulance (%)	204 (12.2)	58 (17.4)	146 (10.9)

p-value = 0.003
[1] Excluded in-patients

Figure 1.9: Mode of Transportation by gender

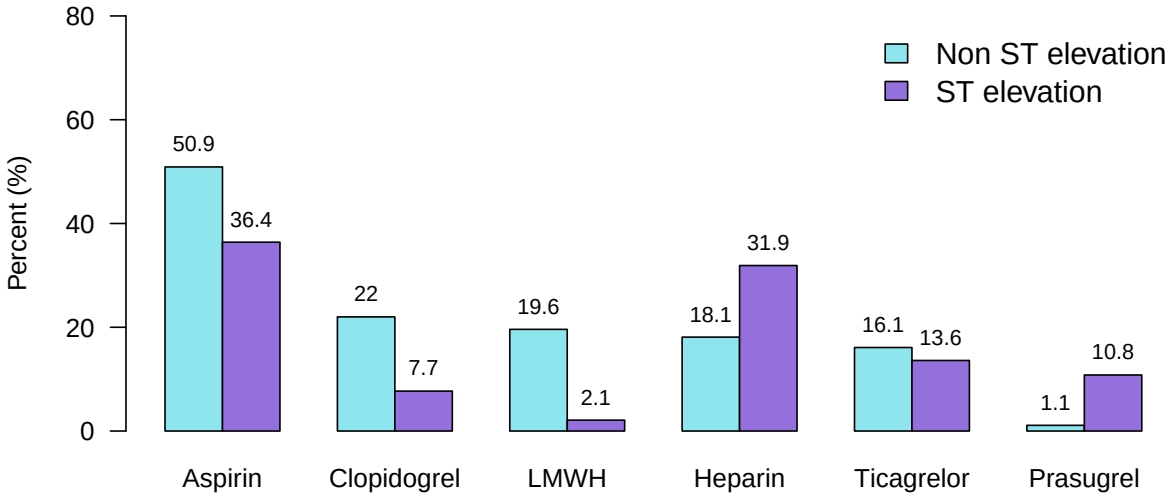


1.5.3 Drugs administered at the Emergency Department (ED)

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

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Aspirin (%)	802 (45.1)	543 (50.9)	259 (36.4)	<0.001
Clopidogrel (%)	290 (16.3)	235 (22.0)	55 (7.7)	<0.001
Prasugrel (%)	89 (5.0)	12 (1.1)	77 (10.8)	<0.001
Ticagrelor (%)	269 (15.1)	172 (16.1)	97 (13.6)	0.174
Heparin (%)	420 (23.6)	193 (18.1)	227 (31.9)	<0.001
LMWH (%)	224 (12.6)	209 (19.6)	15 (2.1)	<0.001

Figure 1.10: Drugs administered at the Emergency Department (ED)



1.5.4 Ward of First Arrival by ECG on Admission

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

Table 1.10: Ward of First Arrival by ECG on Admission

	Total	Non ST elevation	ST elevation
n	1778	1067	711
Directly to cath laboratory (%)	134 (7.5)	7 (0.7)	127 (17.9)
Directly to CCU (%)	202 (11.4)	23 (2.2)	179 (25.2)
ED (%)	1430 (80.4)	1027 (96.3)	403 (56.7)
Other (%)	12 (0.7)	10 (0.9)	2 (0.3)

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

1.5.5 First Ward of Hospitalization

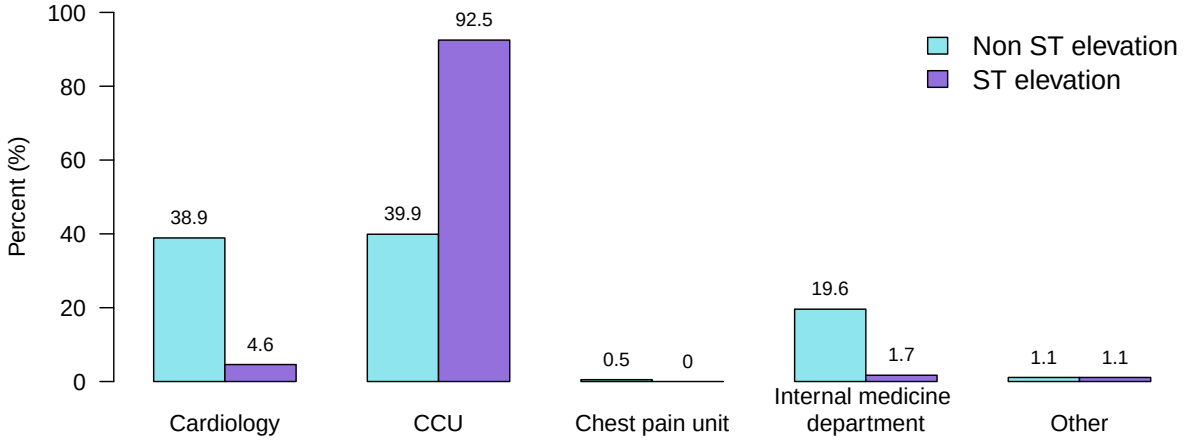
As expected, the majority of patients presenting with ST elevation were hospitalized in the cardiac care unit (CCU) (92.5%). 39.9% of the patients who presented with non-ST elevation were admitted to the CCU and an additional 38.9% to a cardiology department, with the remaining 19.6% being admitted to internal medicine departments.

Table 1.11: First Ward of Hospitalization

	Total	Non ST elevation	ST elevation
n	1778	1067	711
Cardiology (%)	448 (25.2)	415 (38.9)	33 (4.6)
CCU (%)	1084 (61.0)	426 (39.9)	658 (92.5)
Chest pain unit (%)	5 (0.3)	5 (0.5)	0 (0.0)
Internal medicine (%)	221 (12.4)	209 (19.6)	12 (1.7)
Other (%)	20 (1.1)	12 (1.1)	8 (1.1)

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

Figure 1.11: First Ward of Hospitalization



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

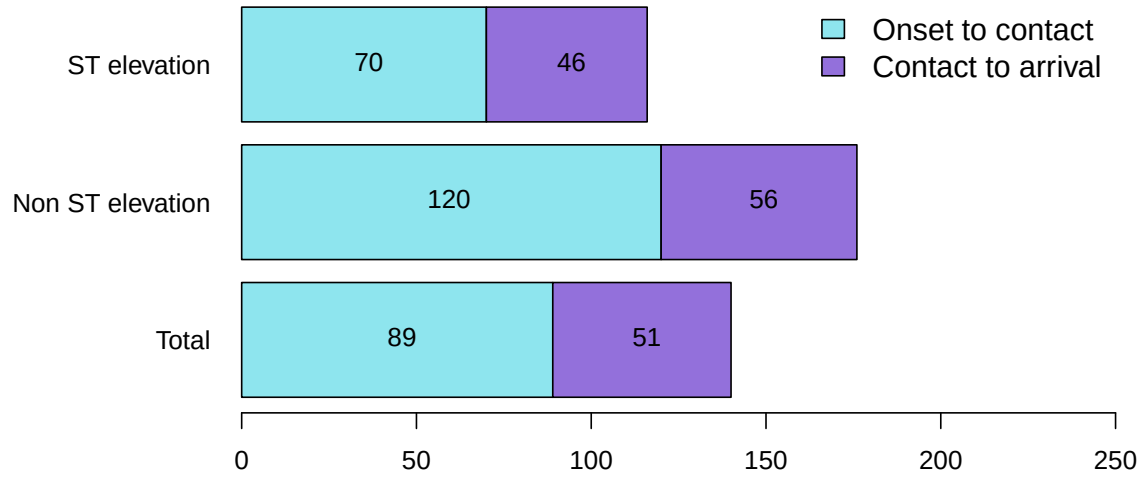
All time frames were significantly shorter for patients with ST elevation. Patients with ST elevation sought help earlier when compared to patients with non-ST elevation.

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

	Total	Non ST elevation	ST elevation	p-value
n[1]	1164	632	532	
Onset to first medical contact (median [IQR])	89.00 [36.50, 232.00]	120.00 [44.25, 385.25]	70.00 [34.00, 170.00]	0.001
First medical contact to arrival (median [IQR])	51.00 [35.00, 75.50]	56.00 [37.00, 98.00]	46.00 [32.75, 65.00]	<0.001
Onset to arrival (median [IQR])	150.00 [90.00, 356.25]	190.00 [105.00, 530.50]	130.00 [84.00, 248.00]	<0.001

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

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



1.5.7 Time from Symptom Onset to Hospital Arrival, by gender

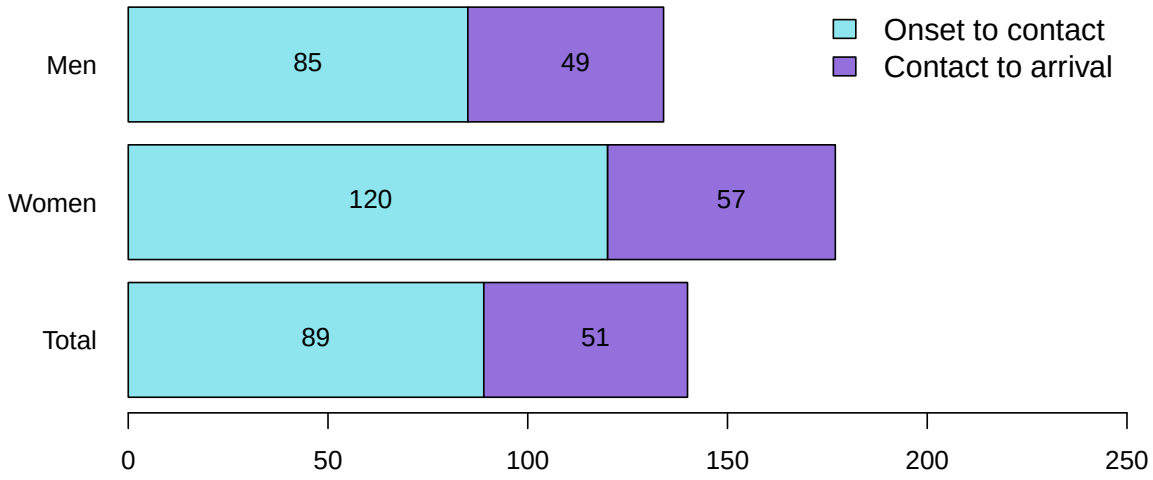
Men were more likely to seek help earlier than women. Men also arrived faster to the emergency room (ER) after seeking for help.

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

	Total	Women	Men	p-value
n[1]	1164	245	919	
Onset to first medical contact (median [IQR])	89.00 [36.50, 232.00]	120.00 [42.00, 301.50]	85.00 [35.00, 211.25]	0.268
First medical contact to arrival (median [IQR])	51.00 [35.00, 75.50]	57.00 [37.00, 92.00]	49.00 [34.00, 73.00]	0.013
Onset to arrival (median [IQR])	150.00 [90.00, 356.25]	186.50 [96.00, 413.25]	145.00 [90.00, 323.25]	0.118

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

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



1.5.8 First Medical Contact

31.9% of patients had the first medical contact at the emergency room (ER) and about 31.7% at a primary clinic/"Moked". For an additional 23.6% the primary medical contact was with a mobile intensive care unit (MICU). Patients with ST elevation were more likely to have their first medical contact with a MICU (34.7%) than those with non-ST elevation (16.2%).

Table 1.14: First Medical Contact

	Total	Non ST elevation	ST elevation
n	1778	1067	711
ER (%)	567 (31.9)	400 (37.5)	167 (23.5)
HMO Out Pts. clinic / Moked (%)	564 (31.7)	357 (33.5)	207 (29.1)
Home visit (%)	46 (2.6)	24 (2.2)	22 (3.1)
In-patient (%)	47 (2.6)	35 (3.3)	12 (1.7)
MICU (%)	420 (23.6)	173 (16.2)	247 (34.7)
Other hospital (%)	26 (1.5)	23 (2.2)	3 (0.4)
Regular ambulance (%)	108 (6.1)	55 (5.2)	53 (7.5)

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

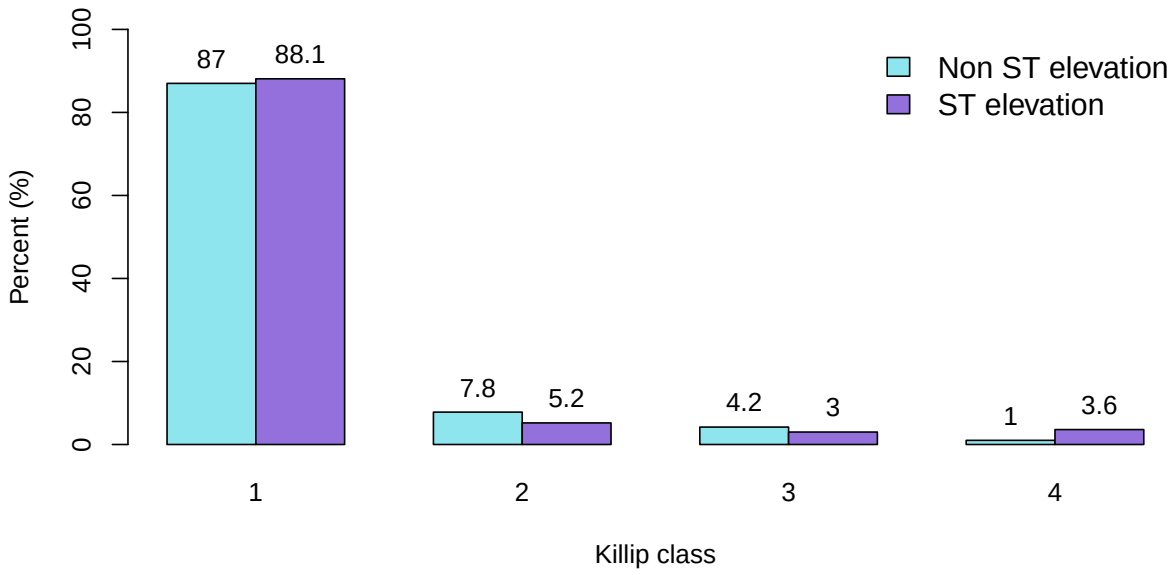
1.5.9 Presenting Symptoms and Killip Class

Typical angina was significantly more frequent in petients presenting with ST elevation (83.3%) than those presenting with non-ST elevation (77.1%). However, atypical chest pain was more common in patients presenting with non-ST elevation (14.1%) than in those with ST elevation (9%). Also dyspnea was more common in patients with non-ST elevation (33.6%) than those with ST elevation (17.9%)

Table 1.15: Presenting Symptoms at First Medical Contact

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Typical angina (%)	1415 (79.6)	823 (77.1)	592 (83.3)	0.002
Atypical chest pain (%)	214 (12.0)	150 (14.1)	64 (9.0)	0.002
Syncope (%)	55 (3.1)	21 (2.0)	34 (4.8)	0.001
Aborted SCD (%)	38 (2.1)	12 (1.1)	26 (3.7)	0.001
Palpitations (%)	46 (2.6)	41 (3.8)	5 (0.7)	<0.001
Dyspnea (%)	485 (27.3)	358 (33.6)	127 (17.9)	<0.001
Abdominal pain (%)	105 (5.9)	51 (4.8)	54 (7.6)	0.018

Figure 1.14: Killip Class on Admission



1.5.10 Pre-Hospital Treatment (before ED arrival)

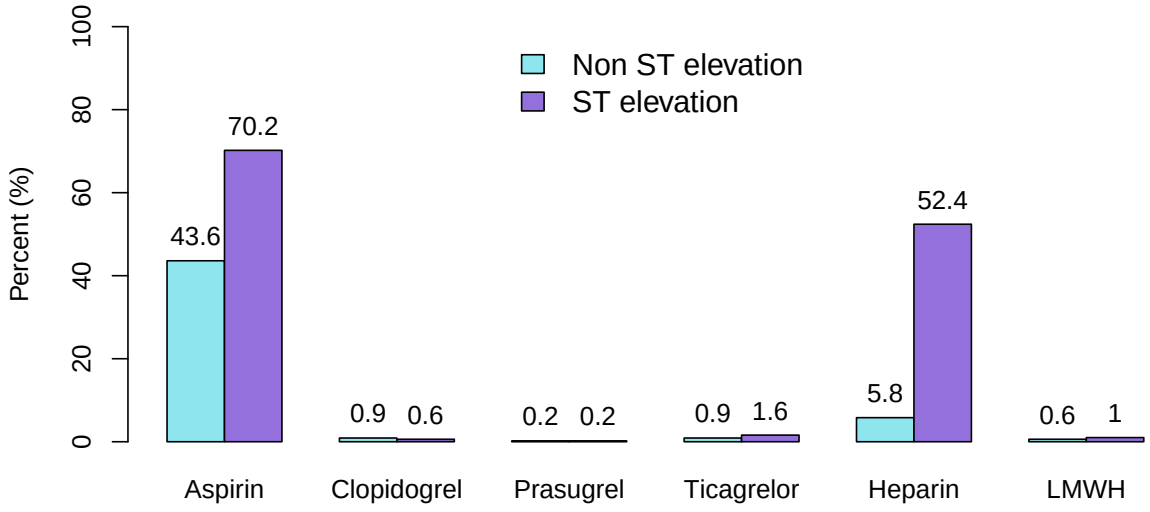
At first medical contact, patients with ST elevation were significantly more likely to receive therapy with aspirin and heparin than patients with non-ST elevation.

Table 1.16 Pre-Hospitalization Treatment

	Total	Non ST elevation	ST elevation	p-value
n[1]	964	468	496	
Aspirin (%)	552 (57.3)	204 (43.6)	348 (70.2)	<0.001
Clopidogrel (%)	7 (0.7)	4 (0.9)	3 (0.6)	0.938
Prasugrel (%)	2 (0.2)	1 (0.2)	1 (0.2)	1.000
Ticagrelor (%)	12 (1.2)	4 (0.9)	8 (1.6)	0.441
Heparin (%)	287 (29.8)	27 (5.8)	260 (52.4)	<0.001
LMWH (%)	8 (0.8)	3 (0.6)	5 (1.0)	0.785

[1] Only MICU and regular ambulance patients were included

Figure 1.15: Pre−Hospitalization Treatment

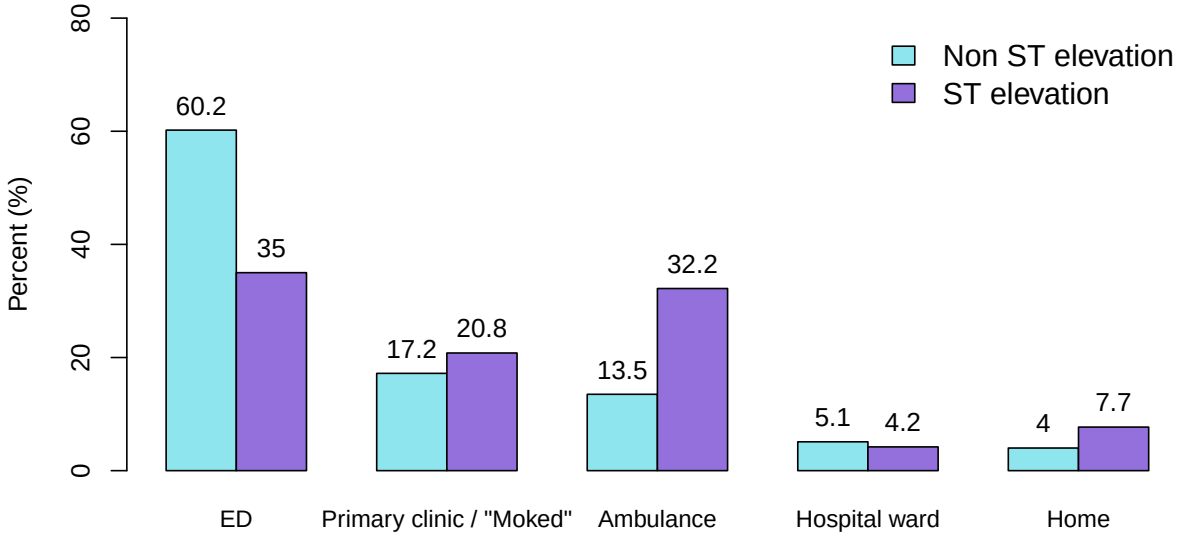


1.6 First Recorded ECG

1.6.1 Location of First ECG Recording

60.2% of patients presenting with non-ST elevation and 35% of patients presenting with ST elevation had their first ECG recorded in the emergency department (ED). With respect to the remaining patients, 39.9% of patients with ST elevation and 17.5% of those with non-ST elevation had the first ECG performed either at home or in an ambulance, and about 20% in both groups had it performed in a primary clinic.

Figure 1.16: Location of First ECG Recording



1.6.2 First ECG Rhythm

About 88% of patients, both with and without ST elevation, presented with a normal sinus rhythm (NSR). 2% of patients with ST elevation and 4.3% of those without ST elevation, presented with atrial fibrillation.

Table 1.18: First ECG Rhythm

	Total	Non ST elevation	ST elevation
n	1778	1067	711
NSR (%)	1573 (88.5)	946 (88.7)	627 (88.2)
Atrial fibrillation (%)	60 (3.4)	46 (4.3)	14 (2.0)
S.Tachycardia (%)	48 (2.7)	30 (2.8)	18 (2.5)
S.Bradycardia (%)	22 (1.2)	11 (1.0)	11 (1.5)
VT/VF (%)	22 (1.2)	7 (0.7)	15 (2.1)
II/III AV Block (%)	16 (0.9)	1 (0.1)	15 (2.1)
Asystole (%)	2 (0.1)	1 (0.1)	1 (0.1)
Other (%)	35 (2.0)	25 (2.3)	10 (1.4)

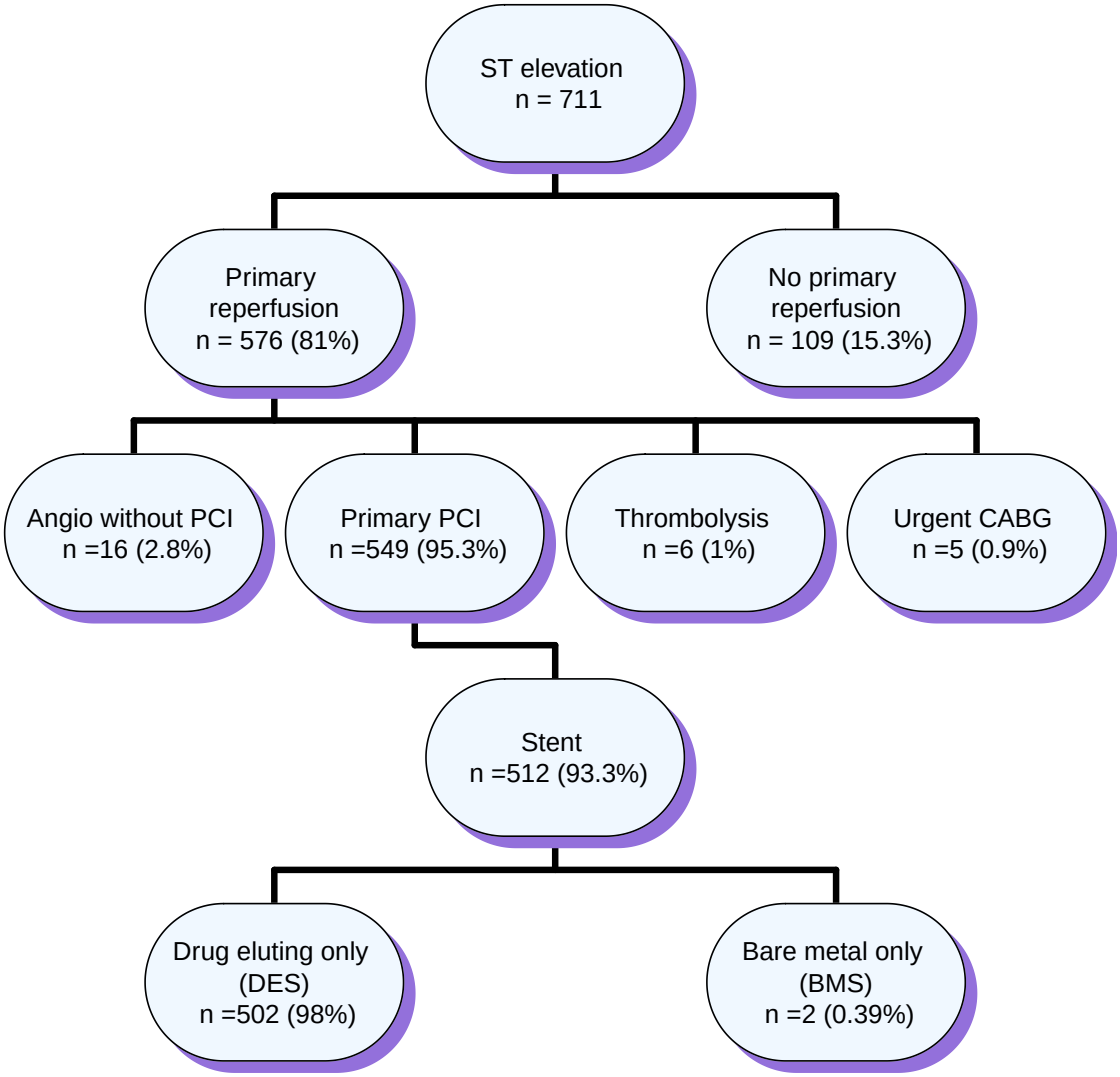
Difference in first ECG rhythm, ST elevation vs. non-ST elevation, p = <0.001

1.7 Primary Reperfusion

1.7.1 Primary Reperfusion Therapy in Patients with ST Elevation

81% of patients with ST elevation underwent primary reperfusion within 12 hours from onset of symptoms, mainly primary PCI. In 93.3% of these cases, stents were deployed with 98% receiving drug eluting stents.

Figure 1.17: Primary Reperfusion in Patients with ST Elevation



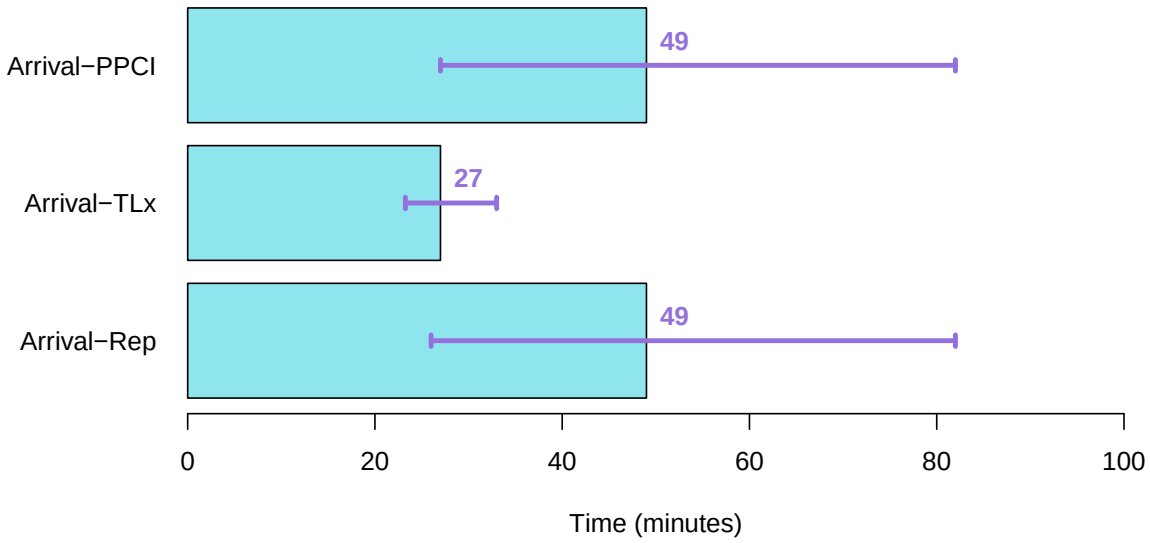
1.7.2 Length of Time from Arrival to Primary Reperfusion

The median time from arrival to primary reperfusion was less than one hour (49 munutes).

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

	N	Time in minutes (median [IQR])
From arrival to reperfusion	489	49.00 [26.00, 82.00]
From arrival to thrombolysis	6	27.00 [23.25, 33.00]
From arrival to primary PCI	465	49.00 [27.00, 82.00]

Figure 1.18: Length of Time from Arrival to Reperfusion (Median, 25%−75%)



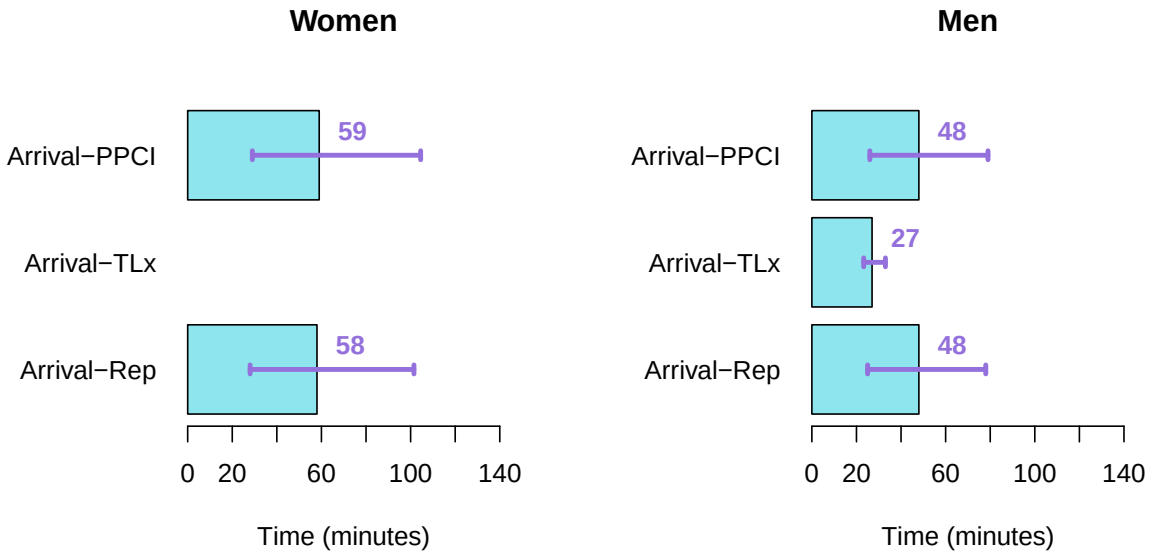
1.7.3 Length of Time from Arrival to Primary Reperfusion, by Gender

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

Table 1.20: 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 reperfusion	58.00 [28.00, 101.50]	86	48.00 [25.00, 78.00]	403	0.039
From arrival to thrombolysis	NA [NA, NA]	0	27.00 [23.25, 33.00]	6	NA
From arrival to primary PCI	59.00 [29.00, 104.50]	79	48.00 [26.00, 79.00]	386	0.027

Figure 1.19: 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 1.21: Drugs and Protective Devices during Primary Reperfusion

	Overall
n	576
IIb/IIIa antagonists (%)	143 (24.8)
Bivalirudin (%)	1 (0.2)
Aspiration device (%)	58 (10.1)

1.7.5 Primary PCI/Angiography

Table 1.21a: Vascular access during Primary Reperfusion

	Overall
n	576
Vascular access	
Femoral	114 (20.3)
Radial	438 (78.1)
Both	9 (1.6)

1.7.6 TIMI Grade Flow of IRA

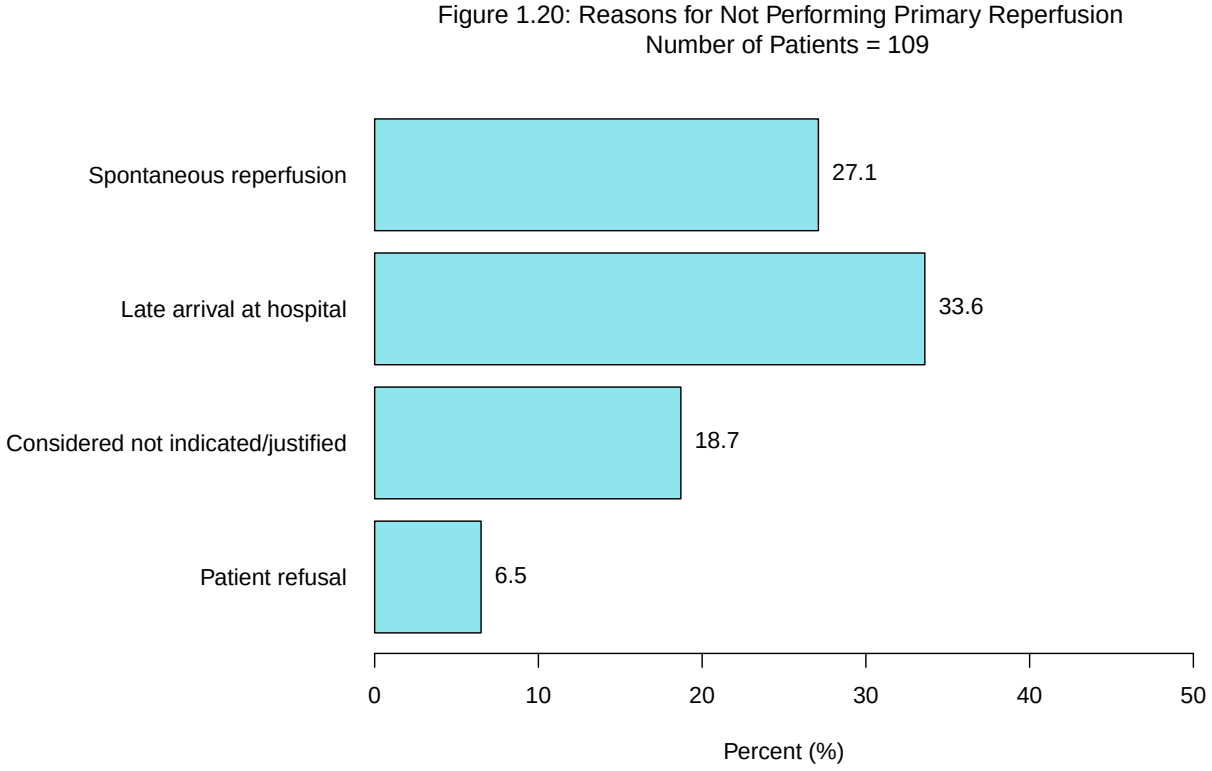
In 53.6% of cases, a TIMI flow grade of zero was observed on first injection to the Infarct Related Artery (IRA). Following revascularization, a TIMI grade flow of 3 was achieved in the majority of patients (90.4%).

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

	Before revascularization (%)	After revascularization (%)
n	470	544
0	252 (53.6)	17 (3.1)
1	60 (12.8)	8 (1.5)
2	58 (12.3)	27 (5.0)
3	100 (21.3)	492 (90.4)

1.7.7 Reasons for Not Performing Primary Reperfusion

15.3% of patients presenting with ST elevation did not receive primary reperfusion therapy. In 27.1% the reason was spontaneous reperfusion, in 33.6% the reason was late arrival at the hospital, and in 18.7% of cases primary reperfusion was considered not indicated.



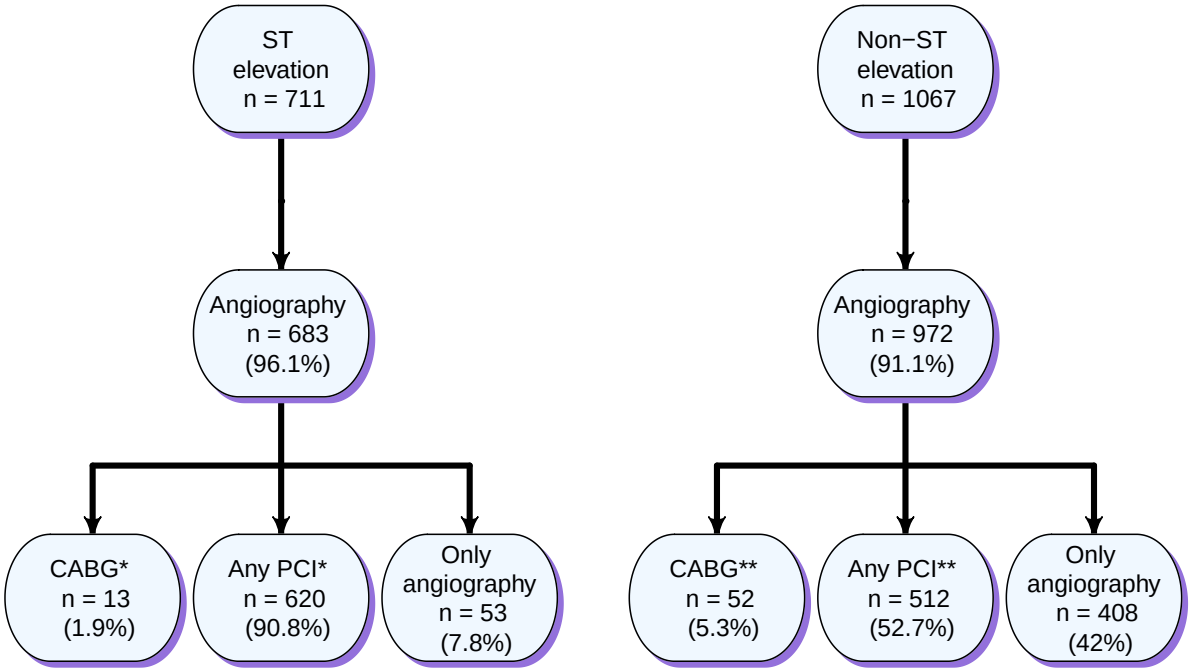
- There were no patients with contraindication to thrombolysis and no patient died before decision.

1.8 Coronary Interventions and Procedures during Hospitalization

1.8.1 Coronary Angiography and Interventions

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

Figure 1.21: In−Hospital Cardiac Interventions and Procedures



*3 patients underwent both CABG and PCI; ** 0 patients underwent both CABG and PCI.

1.8.2 Coronary angiography (*excluding primary PCI*)

Table 1.23: Vascular access during coronary angiography

	Overall
n	1778
Coronary angiography	1167 (65.7)
Vascular access	
Femoral	99 (11.9)
Radial	710 (85.0)
Both	26 (3.1)

1.8.3 Other Procedures

97.2% of patients with ST elevation and 87.1% of those with non-ST elevation underwent echocardiography. Patients with ST elevation were more likely to receive resuscitation, DC shocks, mechanical ventilation, intra-aortic balloon counter pulsation (IABP) and temporary pacemakers than those with non-ST elevation.

Table 1.23a: Other Procedures

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Echo (%)	1619 (91.1)	928 (87.1)	691 (97.2)	<0.001
DC shock (%)	37 (2.1)	15 (1.4)	22 (3.1)	0.023
Resuscitation (%)	36 (2.0)	12 (1.1)	24 (3.4)	0.002
Mechanical ventilation (%)	62 (3.5)	21 (2.0)	41 (5.8)	<0.001
IABP (%)	35 (2.0)	15 (1.4)	20 (2.8)	0.054
Dialysis (%)	25 (1.4)	20 (1.9)	5 (0.7)	0.064
AICD/CRT (%)	8 (0.4)	3 (0.3)	5 (0.7)	0.347
Permanent pacemaker (%)	9 (0.5)	1 (0.1)	8 (1.1)	0.008
Temporary pacemaker (%)	17 (1.0)	4 (0.4)	13 (1.8)	0.005
Therapeutic Hypothermia (%)	18 (1.0)	6 (0.6)	12 (1.7)	0.037

1.9 Ejection Fraction

Ejection fraction (EF) was determined in 90.7% of patients with ST elevation and in 81.7% of those with non-ST elevation. EF was normal in a larger proportion of patients with non-ST elevation (59.5%) than in patients with ST elevation (36.4%). 27.3% of patients with ST elevation and 17.2% of patients with non-ST elevation presented with an EF $< 40\%$.

Table 1.24: Ejection Fraction

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
EF determined (%)	1512 (85.3)	869 (81.7)	643 (90.7)	<0.001
EF (range) (%)				<0.001
Normal ($\geq 50\%$)	751 (49.7)	517 (59.5)	234 (36.4)	
Mild (40-49%)	436 (28.8)	203 (23.4)	233 (36.2)	
Moderate (30-39%)	233 (15.4)	99 (11.4)	134 (20.8)	
Severe ($< 30\%$)	92 (6.1)	50 (5.8)	42 (6.5)	

Note:
EF range percentages are calculated out of EF determined patients only

1.10 In-Hospital Complications

Cardiogenic shock, ventricular fibrillation (VF), High degree ($2-3^0$) AVB and Sepsis were more frequent in patients with ST elevation.

Table 1.25: In-Hospital Complications

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
CHF mild-moderate (Killip-2) (%)	131 (7.4)	77 (7.2)	54 (7.6)	0.838
Pulmonary edema (Killip-3) (%)	59 (3.3)	36 (3.4)	23 (3.2)	0.976
Cardiogenic shock (Killip-4) (%)	55 (3.1)	22 (2.1)	33 (4.7)	0.003
Hemodynamically significant RV infarction (%)	8 (0.5)	2 (0.2)	6 (0.8)	0.096
Re-MI (%)	11 (0.6)	5 (0.5)	6 (0.8)	0.498
Post MI angina/re-ischemia (%)	21 (1.2)	13 (1.2)	8 (1.1)	1.000
Stent thrombosis (definite/probable/possible) (%)	5 (0.3)	1 (0.1)	4 (0.6)	0.172
Free wall rupture (%)	2 (0.1)	0 (0.0)	2 (0.3)	0.312
Tamponade (%)	3 (0.2)	0 (0.0)	3 (0.4)	0.125
MR Moderate-severe (%)	15 (0.8)	7 (0.7)	8 (1.1)	0.428
Pericarditis (%)	9 (0.5)	3 (0.3)	6 (0.8)	0.195
Sustained VT (>125 bpm) (%)	19 (1.1)	9 (0.8)	10 (1.4)	0.372
VF (%)	31 (1.7)	7 (0.7)	24 (3.4)	<0.001
New AF (%)	75 (4.2)	37 (3.5)	38 (5.3)	0.071
High degree (2-3) AVB (%)	26 (1.5)	8 (0.8)	18 (2.5)	0.004
Asystole (%)	36 (2.0)	16 (1.5)	20 (2.8)	0.080
TIA (%)	5 (0.3)	2 (0.2)	3 (0.4)	0.649
Stroke (%)	8 (0.5)	4 (0.4)	4 (0.6)	0.829
CVA/TIA in hospital (%)	13 (0.7)	6 (0.6)	7 (1.0)	0.460
Acute renal injury (%)	87 (4.9)	47 (4.4)	40 (5.6)	0.295
Sepsis (%)	36 (2.0)	15 (1.4)	21 (3.0)	0.036
Major bleeding (%)	49 (2.8)	29 (2.7)	20 (2.8)	1.000
Minor bleeding (%)	41 (2.3)	24 (2.3)	17 (2.4)	0.974
Blood transfusions (%)	39 (2.2)	20 (1.9)	19 (2.7)	0.339

1.11 In-Hospital Medical Treatment

Prasugrel, llb/llla antagonists, warfarin, heparin (UFH), ACE-I, aldactone, PPI and IV inotropic agent were more frequently used in patients with ST elevation. Clopidogrel, ticagrelor, low molecular weight heparin (LMWH), fondaparinux, ARB, CCB and nitrates were more frequently used among patients with non ST elevation. Both groups of patients were equally treated with aspirin, NOACS, beta blockers, digoxin, amiodarone, diuretics, colchicine, steroids, insulin and statins.

Table 1.26: In-Hospital Medical Treatment

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
Anti-platelets				
Aspirin (%)	1674 (98.0)	994 (97.7)	680 (98.4)	0.426
Clopidogrel (%)	741 (58.6)	548 (67.7)	193 (42.5)	<0.001
Prasugrel (%)	389 (35.6)	89 (15.1)	300 (59.8)	<0.001
Ticagrelor (%)	837 (64.5)	534 (68.5)	303 (58.6)	<0.001
P2Y12 (%)	1658 (98.1)	976 (97.6)	682 (98.8)	0.097
llb/llla antagonists (%)	51 (5.3)	17 (2.9)	34 (9.0)	<0.001
Anticoagulants				
Oral anticoagulants[1] (%)	167 (17.9)	101 (17.9)	66 (17.9)	1.000
Warfarin (%)	39 (4.4)	14 (2.7)	25 (7.0)	0.004
Dabigatran (%)	20 (2.3)	11 (2.1)	9 (2.6)	0.764
Rivaroxaban (%)	33 (3.8)	22 (4.1)	11 (3.2)	0.598
Apixaban (%)	82 (9.1)	56 (10.3)	26 (7.4)	0.171
LMWH (%)	428 (38.8)	332 (47.4)	96 (23.9)	<0.001
Heparin (UFH) (%)	404 (37.1)	197 (30.6)	207 (46.4)	<0.001
Bivalirudin (%)	2 (0.2)	1 (0.2)	1 (0.3)	1.000
Fondaparinux (%)	41 (4.8)	37 (7.1)	4 (1.2)	<0.001
Other				
ACE-I (%)	1059 (81.0)	561 (76.6)	498 (86.6)	<0.001
ARB (%)	281 (33.1)	203 (39.0)	78 (23.7)	<0.001
ACE-I/ARB (%)	1319 (91.0)	754 (89.1)	565 (93.7)	0.004
Aldactone (%)	162 (21.2)	73 (16.9)	89 (26.7)	0.001
Beta Blockers (%)	1316 (89.4)	771 (88.2)	545 (91.1)	0.089
Digoxin (%)	16 (2.4)	9 (2.3)	7 (2.4)	1.000
CCB (%)	295 (34.4)	226 (43.5)	69 (20.4)	<0.001
Amiodarone (%)	81 (11.5)	48 (11.9)	33 (10.9)	0.784
Other Anti-Arrhythmic (%)	19 (2.8)	13 (3.3)	6 (2.1)	0.469
Nitrates (%)	166 (21.1)	130 (27.5)	36 (11.5)	<0.001
Diuretics (%)	348 (39.7)	217 (41.7)	131 (36.8)	0.163
PPI (%)	1015 (84.2)	608 (82.9)	407 (86.2)	0.148
H2 Blockers (%)	64 (8.9)	35 (8.6)	29 (9.4)	0.808
NSAIDS (%)	12 (1.8)	10 (2.6)	2 (0.7)	0.123
Colchicine (%)	27 (4.0)	15 (3.9)	12 (4.1)	1.000
Steroids (%)	61 (8.8)	36 (9.0)	25 (8.4)	0.896
Hormonal replacement therapy (%)	14 (2.1)	9 (2.3)	5 (1.7)	0.772
IV inotropic agent (%)	38 (5.6)	13 (3.4)	25 (8.3)	0.009
Antihyperglycemic (%)	436 (83.0)	286 (83.1)	150 (82.9)	1.000
Statins (%)	1683 (99.4)	1006 (99.1)	677 (99.9)	0.105
Ezetimibe (%)	75 (10.7)	53 (13.0)	22 (7.4)	0.025

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

1.12 Duration of Hospitalization

Table 1.27: Length of Stay in ICCU/Cardiology and Total Hospital Stay

	Total	Non ST elevation	ST elevation
n	1778	1067	711
No. of days in ICCU/Cardiology (median [IQR])	3.00 [2.00, 4.00]	3.00 [2.00, 4.00]	3.50 [3.00, 5.00]
Total hospital days (median [IQR])	4.00 [3.00, 5.00]	4.00 [2.00, 5.00]	4.00 [3.00, 5.00]

1.13 Discharge

1.13.1 Medical Treatment on Discharge

Prasugrel, warfarin, ACE-I and aldactone were more often prescribed for patients with ST elevation. Clopidogrel, ticagrelor, LMWH, ARB, CCB, nitrates, diuretics, insulin and ezetimibe were prescribed more often for patients with non-ST elevation. All other recommended drugs were similarly given to both groups.

Table 1.28: Medical Treatment on Discharge among Hospital Survivors

	Total	Non ST elevation	ST elevation	p-value
n	1726	1041	685	
Anti-platelets				
Aspirin (%)	1639 (98.3)	981 (98.2)	658 (98.4)	0.960
Clopidogrel (%)	456 (27.6)	364 (36.9)	92 (13.8)	<0.001
Prasugrel (%)	345 (21.5)	70 (7.3)	275 (42.7)	<0.001
Ticagrelor (%)	779 (48.5)	509 (52.9)	270 (41.9)	<0.001
P2Y12 (%)	1580 (98.3)	943 (97.9)	637 (98.9)	0.189
Anticoagulants				
Oral anticoagulants[1] (%)	164 (17.1)	101 (17.5)	63 (16.5)	0.749
Warfarin (%)	37 (4.1)	14 (2.6)	23 (6.2)	0.010
Dabigatran (%)	19 (2.1)	11 (2.0)	8 (2.3)	1.000
Rivaroxaban (%)	33 (3.7)	22 (4.1)	11 (3.1)	0.554
Apixaban (%)	81 (8.7)	56 (10.0)	25 (6.8)	0.118
LMWH (%)	60 (6.0)	46 (7.5)	14 (3.6)	0.018
Other				
ACE-I (%)	1046 (81.0)	556 (76.5)	490 (86.9)	<0.001
ARB (%)	279 (33.2)	201 (38.9)	78 (24.1)	<0.001
ACE-I/ARB (%)	1304 (91.4)	747 (89.4)	557 (94.2)	0.002
Aldactone (%)	156 (20.6)	70 (16.2)	86 (26.5)	0.001
Beta Blockers (%)	1303 (90.0)	765 (88.7)	538 (92.0)	0.055
Digoxin (%)	14 (2.1)	8 (2.0)	6 (2.1)	1.000
CCB (%)	293 (34.0)	225 (42.5)	68 (20.5)	<0.001
Amiodarone (%)	74 (10.5)	45 (11.0)	29 (9.8)	0.699
Other Anti-Arrhythmic (%)	19 (2.8)	13 (3.2)	6 (2.1)	0.524
Nitrates (%)	162 (20.8)	129 (27.2)	33 (10.9)	<0.001
Diuretics (%)	328 (38.1)	208 (40.1)	120 (35.1)	0.160
PPI (%)	1001 (84.6)	602 (83.1)	399 (86.9)	0.094
H2 Blockers (%)	53 (7.5)	30 (7.4)	23 (7.7)	0.992
NSAIDS (%)	11 (1.6)	10 (2.6)	1 (0.4)	0.056
Colchicine (%)	27 (4.0)	15 (3.9)	12 (4.2)	0.979
Steroids (%)	58 (8.4)	34 (8.5)	24 (8.3)	1.000
Hormonal replacement therapy (%)	13 (1.9)	9 (2.3)	4 (1.4)	0.574
Antihyperglycemic (%)	432 (82.8)	284 (82.8)	148 (82.7)	1.000
Statins (%)	1655 (99.6)	993 (99.4)	662 (100.0)	0.114
Ezetimibe (%)	74 (10.4)	53 (12.6)	21 (7.2)	0.028

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

1.13.2 Discharged to

Table 1.28a: Discharged to

	Total	Non ST elevation	ST elevation
n	1726	1041	685
Discharged to			
Cardiothoracic surgery	72 (4.2)	53 (5.1)	19 (2.8)
Home	1401 (81.2)	844 (81.1)	557 (81.3)
Internal medicine	196 (11.4)	105 (10.1)	91 (13.3)
Nursing home	6 (0.3)	4 (0.4)	2 (0.3)
Other hospital	30 (1.7)	23 (2.2)	7 (1.0)
Other ward	21 (1.2)	12 (1.2)	9 (1.3)

1.14 Re-Hospitalization within 30 Days of Admission

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

Table 1.29: Re-Hospitalization within 30 Days of Admission

	Total	Non ST elevation	ST elevation	p-value
All patients[1]				
n	1726	1041	685	
Re-hospitalization[2] (%)	229 (16.4)	134 (16.0)	95 (16.9)	0.723
Re-hospitalized patients only[2]				
n	265	158	107	
Scheduled (%)	93 (40.8)	47 (35.3)	46 (48.4)	0.065
Cardiac (%)	135 (60.0)	72 (54.5)	63 (67.7)	0.064
* Cardiac scheduled[3] (%)	76 (56.3)	35 (48.6)	41 (65.1)	0.080

[1] Re-hospitalization among hospital survivors
[2] Patients who were re-hospitalized after more than 30 days of admission were excluded from re-hospitalized within 30 days of admission
[3] Percentages are calculated out of cardiac rehospitalizations

1.15 Mortality and Major Adverse Cardiac Event (MACE)

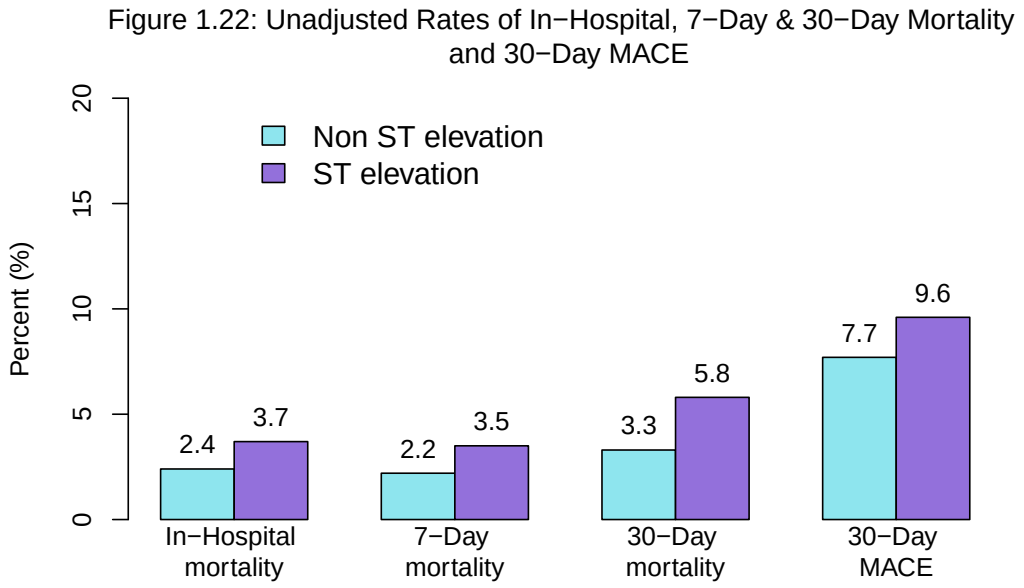
1.15.1 Rates of Mortality and MACE by ECG on Admission

Unadjusted rates of in-hospital mortality, 7-days mortality and 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 were not significantly different in patients with and without ST elevation. However, 30-day mortality was significantly higher for patients with ST elevation compared to those with non-ST elevation.

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

	Total	Non ST elevation	ST elevation	p-value
n	1778	1067	711	
In-hospital mortality (%)	52 (2.9)	26 (2.4)	26 (3.7)	0.176
7-day mortality (%)	46 (2.7)	22 (2.2)	24 (3.5)	0.136
30-day mortality (%)	73 (4.3)	33 (3.3)	40 (5.8)	0.017
MACE[1] (%)	143 (8.4)	77 (7.7)	66 (9.6)	0.189

[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, in-hospital, 7-day, 30-day mortality and 30-day MACE rates were significantly higher for patients with ST elevation compared to those with non-ST elevation.

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

	OR (STEMI vs. NSTEMI) with 95% CI	
	Age adjusted	Risk factors adjusted[1]
In-Hospital	1.63 (0.93,2.87)	1.97 (1,3.92)
7-Days	1.72 (0.95,3.15)	2.17 (1.08,4.47)
30-Days	2.03 (1.26,3.3)	2.46 (1.37,4.48)
MACE[2]	1.38 (0.97,1.96)	1.65 (1.08,2.53)

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

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

1.15.2 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	1778	351	1427	
In-hospital mortality (%)	52 (2.9)	16 (4.6)	36 (2.5)	0.064
7-day mortality (%)	46 (2.7)	17 (5.1)	29 (2.1)	0.005
30-day mortality (%)	73 (4.3)	25 (7.6)	48 (3.5)	0.002
MACE[1] (%)	143 (8.4)	43 (13.1)	100 (7.3)	0.001

[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	1.36 (0.7,2.51)	1.16 (0.55,2.34)
7-Days mortality	1.92 (0.99,3.61)	1.74 (0.83,3.54)
30-Days mortality	1.64 (0.96,2.73)	1.4 (0.75,2.53)
MACE[2]	1.54 (1.03,2.27)	1.72 (1.08,2.69)

[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.

Chapter 2: Temporal Trends 2008-2018

Temporal Trends in Characteristics, Management, and Outcome of Patients with ACS in Cardiology: 2008-2018

2.1 Patients' Characteristics

Table 2.1: Patients' Characteristics

	2008	2010	2013	2016	2018	p for trend
n	1746	1779	1885	1791	1778	
Gender (Male) (%)	1387 (79.4)	1378 (77.5)	1453 (77.1)	1414 (79.0)	1427 (80.3)	0.302
Age (%)						0.4
≤ 50	297 (17.0)	272 (15.3)	297 (15.8)	246 (13.7)	260 (14.6)	
50-75	1111 (63.6)	1158 (65.1)	1195 (63.4)	1162 (64.9)	1158 (65.2)	
> 75	338 (19.4)	349 (19.6)	393 (20.8)	382 (21.3)	357 (20.1)	
Age (mean (sd))	63.26 (13.18)	63.64 (12.67)	63.97 (12.91)	64.67 (12.82)	64.28 (12.69)	0.001

2.2 Cardiovascular History and Risk Factors

Table 2.2: Cardiovascular History and Risk Factors

	2008	2010	2013	2016	2018	p for trend
n	1746	1779	1885	1791	1778	
CV history						
MI (%)	30.9	32.0	30.4	37.2	38.8	<0.001
AP (%)	39.0	34.4	28.9	28.1	25.7	<0.001
Prior PCI (%)	34.0	33.8	34.2	33.4	35.2	0.58
CABG (%)	9.8	10.0	9.1	8.8	9.1	0.264
CHF (%)	8.4	8.5	7.9	6.7	10.4	0.288
Stroke/TIA (%)	6.9	8.2	8.4	8.2	9.2	0.022
Chronic renal failure (%)	12.4	12.0	12.6	11.4	11.4	0.294
PVD (%)	8.2	8.2	7.1	6.0	7.8	0.15
Risk factors						
Hypertension (%)	59.2	66.0	66.1	64.7	67.3	<0.001
Diabetes (%)	37.1	38.0	39.1	41.5	41.8	<0.001
Dyslipidemia (%)	74.5	75.3	75.9	72.7	71.0	0.003
Current smoker (%)	38.9	38.4	39.3	38.5	43.0	0.025
Past smoker (%)	20.9	24.7	20.6	21.1	18.7	0.008
Family Hx of CAD (%)	27.0	31.2	28.8	33.4	34.0	<0.001

2.3 Admission Information

2.3.1 Initial Ward of Hospitalization

Table 2.3: Initial Ward of Hospitalization

	2008	2010	2013	2016	2018
n	1746	1779	1885	1791	1778
Ward (%)					
Cardiology/ICCU	89.2	89.0	84.8	86.8	86.4
Internal Medicine	10.2	9.4	13.5	12.3	12.4
Other	0.6	1.5	1.8	0.9	1.1

p for trend 0.005

2.3.2 ECG on Admission

Table 2.4: ECG on Admission

	2008	2010	2013	2016	2018
n	1746	1779	1885	1791	1778
ST elevation	43.6	43.6	39.7	39.8	40.0
Non ST elevation	56.4	56.4	60.3	60.2	60.0

p for trend 0.003

2.3.3 Killip Class on Admission

Table 2.5: Killip Class on Admission

	2008	2010	2013	2016	2018
n	1746	1779	1885	1791	1778
Killip class (%)					
1	87.6	87.2	87.6	90.5	87.4
2	7.5	6.7	7.1	5.6	6.8
3	3.9	4.3	3.3	2.5	3.7
4	1.0	1.8	1.9	1.4	2.1

p for trend 0.443

2.4 Primary Reperfusion Therapy in Patients with ST Elevation

Figure 2.1: Primary Reperfusion among Patients with ST Elevation

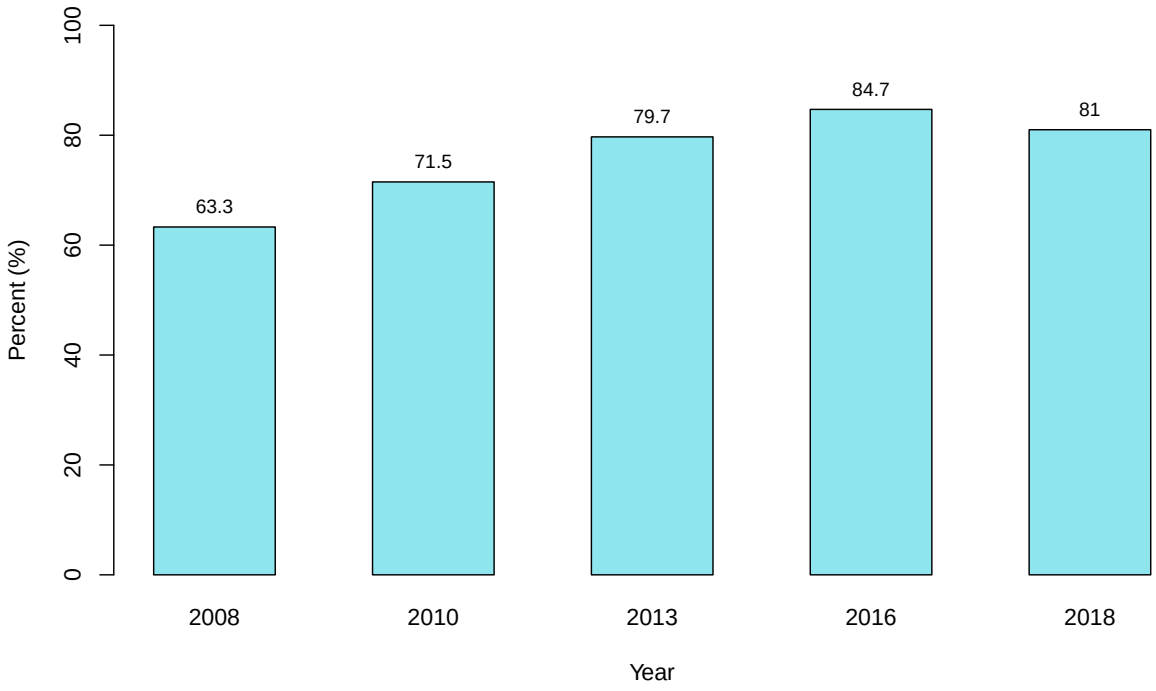
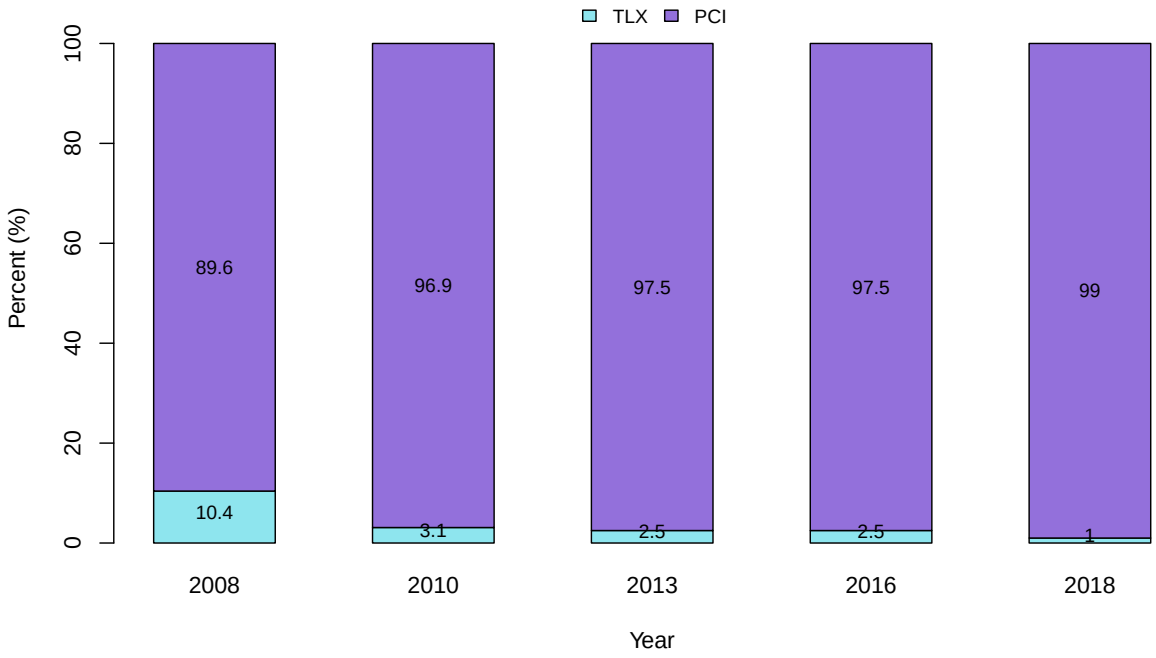


Figure 2.2: Type or Primary Reperfusion among Patients with ST Elevation



2.4.1 Primary PCI/Angiography

Table 2.5.1: Vascular access during Primary Reperfusion

	2008	2010	2013	2016	2018
n	482	555	596	603	576
Vascular access					
Femoral	0 (NaN)	374 (72.3)	225 (39.5)	126 (21.6)	114 (20.3)
Radial	0 (NaN)	143 (27.7)	345 (60.5)	449 (76.9)	438 (78.1)
Both	0 (NaN)	0 (0.0)	0 (0.0)	9 (1.5)	9 (1.6)

2.4.2 Coronary angiography (*excluding primary PCI*)

Table 2.5.2: Vascular access during coronary angiography

	2008	2010	2013	2016	2018
n	1746	1779	1885	1791	1778
Coronary angiography	1094 (63.2)	1094 (62.1)	1129 (60.9)	1127 (64.1)	1167 (65.7)
Vascular access					
Femoral	0 (NaN)	0 (NaN)	0 (NaN)	187 (16.7)	99 (11.9)
Radial	0 (NaN)	0 (NaN)	0 (NaN)	917 (81.7)	710 (85.0)
Both	0 (NaN)	0 (NaN)	0 (NaN)	19 (1.7)	26 (3.1)

2.5 Time Intervals

Table 2.6: Time Intervals in reperfused patients (minutes)

	2008	2010	2013	2016	2018	p for trend
n	482	555	596	603	576	
Symptom onset to ER arrival (median [IQR])	114.00 [70.00, 210.00]	115.00 [70.00, 211.50]	129.50 [74.00, 250.25]	116.00 [70.00, 194.00]	120.00 [71.50, 211.75]	0.352
ER arrival to primary PCI (door to balloon) (median [IQR])	67.00 [39.00, 108.00]	65.00 [38.00, 110.00]	67.00 [35.00, 105.00]	50.00 [26.00, 85.00]	49.00 [27.00, 82.00]	<0.001
ER arrival to TLx (median [IQR])	35.00 [21.00, 50.00]	50.00 [32.00, 68.50]	31.50 [20.00, 50.50]	34.50 [27.25, 66.00]	27.00 [23.25, 33.00]	0.772
Onset to balloon (median [IQR])	194.50 [127.50, 310.00]	195.00 [131.00, 330.00]	200.00 [137.50, 350.00]	169.00 [120.00, 284.25]	180.00 [120.00, 286.25]	0.035
Door to balloon $\leq$ 90 min. (%)	272 (67.3)	334 (66.7)	352 (69.7)	413 (77.9)	374 (80.4)	<0.001

Table 2.7: Time Intervals (minutes) in reperfused patient, by gender

	2008	2010	2013	2016	2018	p for trend
Men						
n	401	455	499	493	482	
Symptom onset to ER arrival (median [IQR])	111.00 [69.50, 205.50]	110.00 [67.00, 210.00]	126.00 [71.00, 240.00]	110.00 [65.25, 191.00]	119.00 [70.00, 211.00]	0.551
ER arrival to primary PCI (door to balloon) (median [IQR])	65.50 [38.25, 102.50]	64.00 [36.25, 103.00]	67.00 [37.00, 105.25]	50.00 [25.00, 85.00]	48.00 [26.00, 79.00]	<0.001
ER arrival to TLx (median [IQR])	37.00 [20.75, 50.50]	55.00 [40.00, 72.00]	30.00 [20.00, 46.00]	34.50 [27.25, 66.00]	27.00 [23.25, 33.00]	0.792
Onset to balloon (median [IQR])	182.50 [125.75, 300.00]	188.00 [125.00, 324.50]	195.00 [132.75, 345.00]	165.00 [116.00, 270.00]	175.50 [115.25, 278.75]	0.032
Women						
n	81	100	97	110	94	
Symptom onset to ER arrival (median [IQR])	121.00 [75.00, 265.00]	130.00 [86.50, 233.50]	147.00 [85.00, 330.00]	124.00 [93.25, 227.75]	125.00 [79.00, 241.00]	0.354
ER arrival to primary PCI (door to balloon) (median [IQR])	72.00 [40.25, 130.00]	78.00 [40.00, 132.00]	63.00 [33.00, 103.00]	58.50 [30.00, 94.00]	59.00 [29.00, 104.50]	0.096
ER arrival to TLx (median [IQR])	30.00 [25.00, 41.00]	23.00 [19.00, 27.00]	70.00 [70.00, 70.00]	NA [NA, NA]	NA [NA, NA]	0.392
Onset to balloon (median [IQR])	210.00 [133.75, 385.00]	249.50 [155.00, 356.75]	212.00 [150.00, 397.00]	188.00 [144.00, 385.00]	195.50 [151.75, 300.00]	0.674

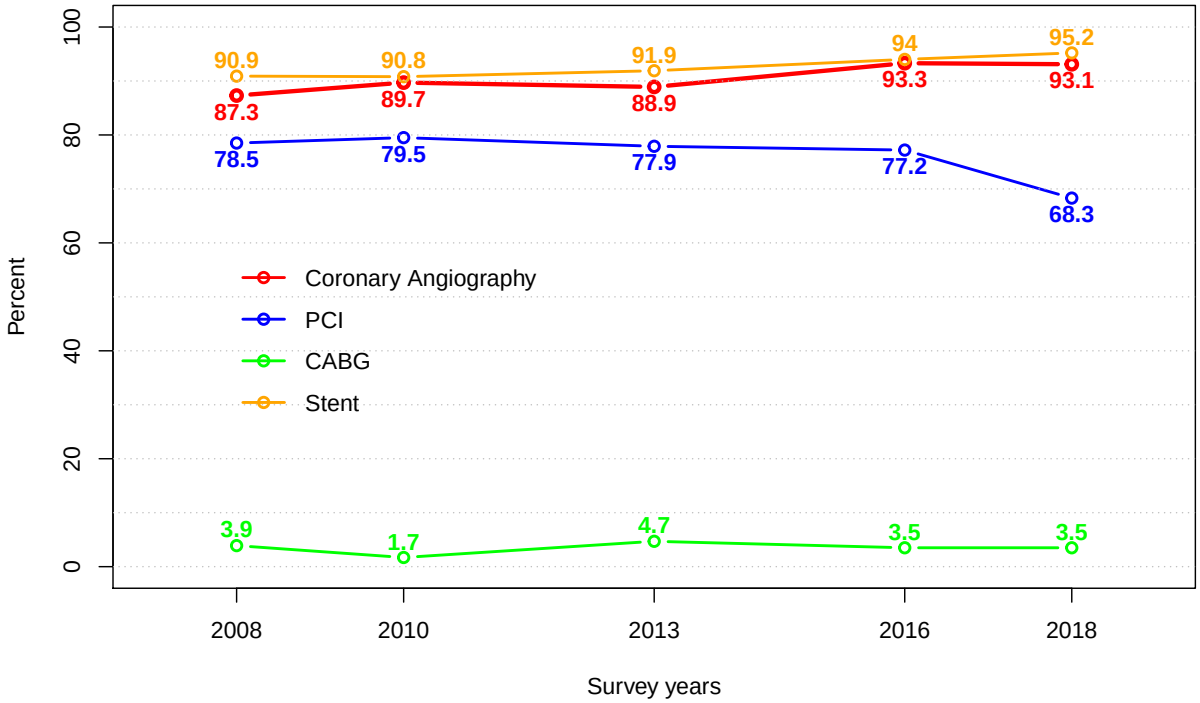
2.6 Procedures during Hospitalization in CCU

Table 2.8 Procedures during Hospitalization in CCU

	2008	2010	2013	2016	2018	p for trend
n	1746	1779	1885	1791	1778	
Coronary Angiography (%)	87.3	89.7	88.9	93.3	93.1	<0.001
Any PCI [1] (%)	78.5	79.5	77.9	77.2	68.3	<0.001
Stent (%)	90.9	90.8	91.9	94.0	95.2	<0.001
CABG (%)	3.9	1.7	4.7	3.5	3.5	0.474
IABP (%)	4.8	4.6	2.3	2.2	2.0	<0.001
Echocardiography (%)	86.5	85.9	85.2	85.7	91.2	<0.001

[1] Percent of all patients undergoing angiography

Figure 2.3: Trends In−Hospital Procedures



2.7 In-Hospital Complications

Table 2.9: In-Hospital Complications

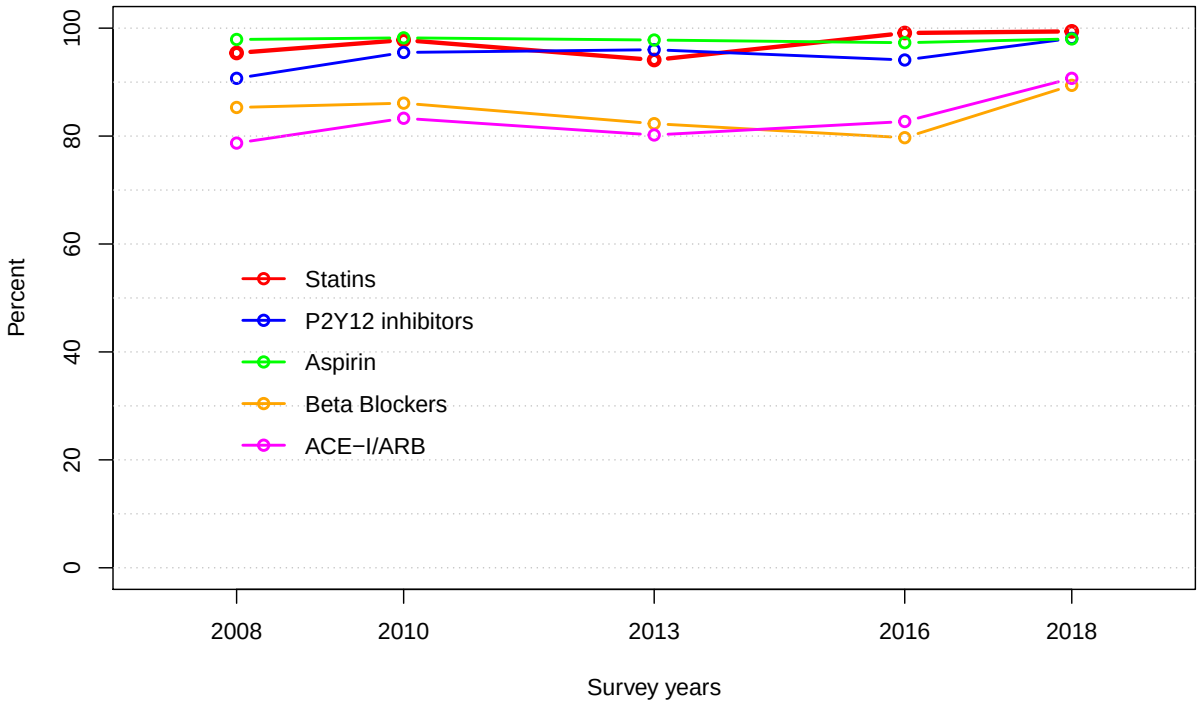
	2008	2010	2013	2016	2018	p for trend
n	1746	1779	1885	1791	1778	
Re-MI (%)	1.5	1.1	1.0	0.5	0.6	0.001
Post MI angina/Re-ischemia (%)	3.6	2.0	2.0	1.3	1.2	<0.001
Sub-Acute Stent Thrombosis (%)	1.3	0.6	0.8	0.7	0.3	0.003
Mild-moderate CHF (Killip 2) (%)	7.5	7.8	6.1	5.9	7.4	0.244
Pulmonary edema (Killip 3) (%)	6.6	4.9	4.4	3.1	3.3	<0.001
Cardiogenic shock (Killip 4) (%)	2.7	3.1	3.3	2.0	3.1	0.691
Free wall rupture (%)	0.6	0.1	0.1	0.2	0.1	0.005
Tamponade (%)	0.5	0.3	0.0	0.2	0.2	0.024
Moderate-severe MR (%)	1.6	1.7	2.1	1.1	0.8	0.021
Sustained VT (%)	1.0	1.3	1.3	1.1	1.1	0.949
High degree AVB (2-3) (%)	2.2	2.1	1.5	1.4	1.5	0.021
Primary VF (%)	1.2	1.9	1.2	1.3	1.3	0.604
Secondary VF (%)	1.3	0.6	0.5	0.6	0.5	0.006
Asystole (%)	2.1	1.9	1.9	1.3	2.0	0.523
TIA (%)	0.2	0.1	0.2	0.1	0.3	0.369
Stroke (%)	0.6	0.5	0.6	0.5	0.5	0.506
Acute renal injury (%)	4.4	6.1	4.6	5.1	4.9	0.975
Bleeding (%)	1.5	2.4	0.9	1.8	2.8	0.07

2.8 In-Hospital Treatment

Table 2.10: In-Hospital Treatment

	2008	2010	2013	2016	2018	p for trend
n	1746	1779	1885	1791	1778	
Aspirin (%)	97.9	98.2	97.8	97.3	98.0	0.519
Heparin (%)	36.8	43.2	53.3	44.7	37.1	0.042
LMWH (%)	50.0	45.9	41.9	33.5	38.8	<0.001
P2Y12 inhibitors (%)	90.7	95.5	96.0	94.1	98.1	<0.001
IIb/IIIa antagonists (%)	31.2	24.6	13.6	9.1	5.3	<0.001
Beta Blockers (%)	85.3	86.1	82.3	79.7	89.4	0.996
ACE-I/ARB (%)	78.7	83.3	80.2	82.7	90.7	<0.001
Statins (%)	95.4	97.8	94.1	99.1	99.4	<0.001
LLDs (%)	94.7	97.1	93.1	100.0	94.8	0.065
Digoxin (%)	2.2	1.4	1.1	1.3	1.6	0.085
Diuretic (%)	29.1	27.9	24.8	22.6	32.5	0.201
Nitrates (%)	27.6	23.7	16.6	13.9	17.6	<0.001

Figure 2.4: Trends in Hospital Treatment

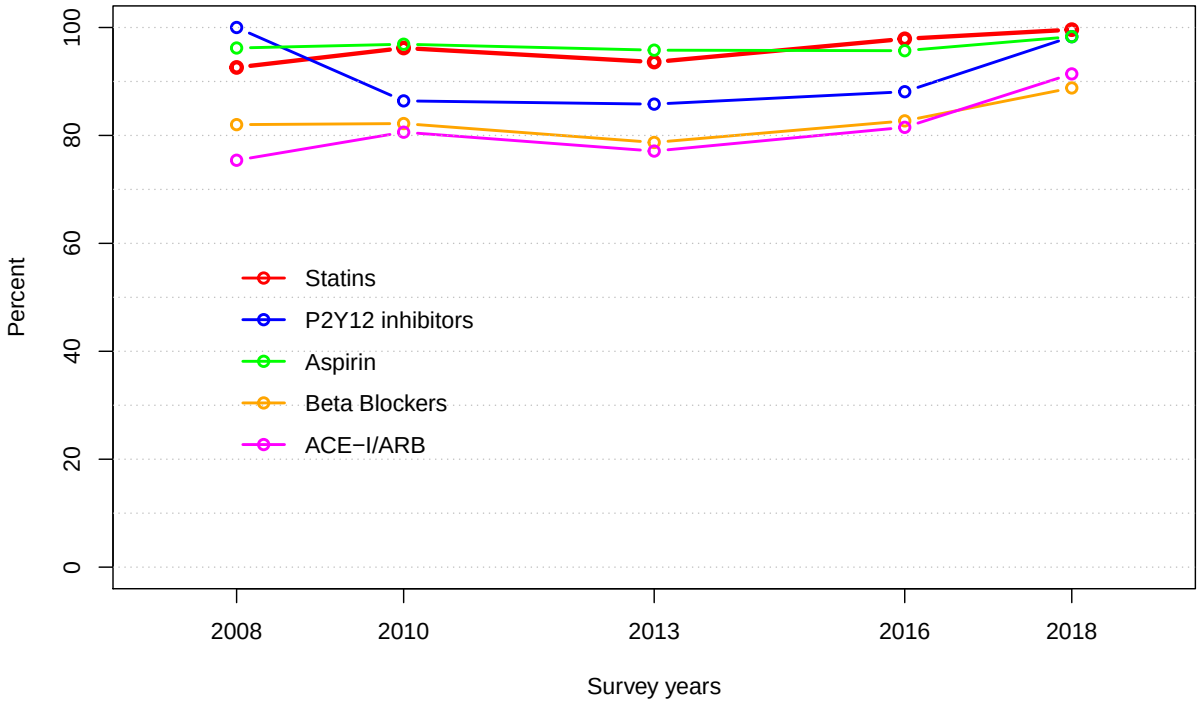


2.9 Medical Treatment on Discharge

Table 2.11: Medical Treatment on Discharge among Hospital Survivors

	2008	2010	2013	2016	2018	p for trend
n	1702	1741	1848	1761	1726	
Aspirin (%)	96.2	96.9	95.8	95.7	98.3	0.051
Beta Blockers (%)	82.0	82.2	78.7	82.7	88.8	<0.001
P2Y12 inhibitors (%)	100.0	86.4	85.8	88.1	98.3	0.565
ACE-I/ARB (%)	75.4	80.6	77.1	81.5	91.4	<0.001
Statins (%)	92.6	96.2	93.6	97.9	99.6	<0.001
LLDs (%)	93.7	96.4	93.8	100.0	99.1	<0.001
Digoxin (%)	1.5	1.0	0.9	1.3	1.3	0.814
Diuretic (%)	24.0	22.8	19.7	22.4	33.6	0.002
Nitrates (%)	8.6	6.7	7.6	5.4	12.6	0.334

Figure 2.5: Medical Treatment in Discharge among Hospital Survivors



2.10 Short and long Term Outcomes

Table 2.12: Rates of Mortality and MACE[1]

	2008	2010	2013	2016	2018	p for trend
n	1746	1779	1885	1791	1778	
Mortality						
In-hospital	2.5	2.1	2.0	1.7	2.9	0.749
7-day	2.6	2.2	1.8	1.6	2.7	0.678
30-day	4.4	4.2	3.7	3.0	4.3	0.349
1 year	8.1	8.1	8.3	7.8	8.9	0.624
MACE[1]						
30-day MACE	12.5	10.3	10.4	8.9	8.4	<0.001

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

Figure 2.6: Rates of Mortality and 30−day MACE

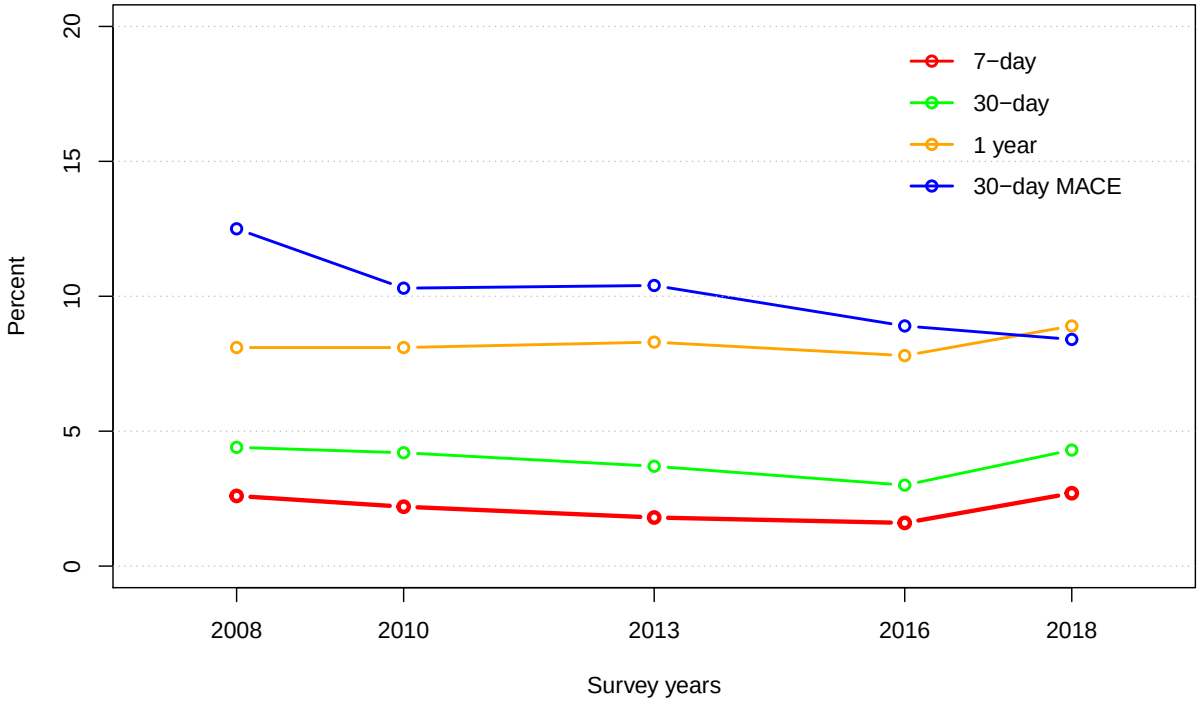


Table 2.13: Rates of Mortality and MACE[1] by Gender

	2008	2010	2013	2016	2018	p for trend
Men						
n	1387	1378	1453	1414	1427	
Mortality						
In-hospital	1.9	2.0	1.5	1.3	2.5	0.622
7-day	2.1	1.9	1.3	1.2	2.1	0.54
30-day	3.5	3.6	2.7	2.2	3.5	0.347
1 year	7.4	6.9	6.9	6.8	7.2	0.783
MACE[1]						
30-day	10.7	9.2	9.3	7.9	7.3	0.001
Women						
n	359	401	432	377	351	
Mortality						
In-hospital	5.0	2.5	3.5	3.2	4.6	0.963
7-day	4.5	3.2	3.3	2.9	5.1	0.817
30-day	7.8	6.2	7.0	6.1	7.6	0.885
1 year	10.9	12.3	12.9	11.6	15.8	0.144
MACE[1]						
30-day	19.5	14.2	14.1	12.7	13.1	0.016

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

Figure 2.7: Rates of Mortality and 30−day MACE by gender

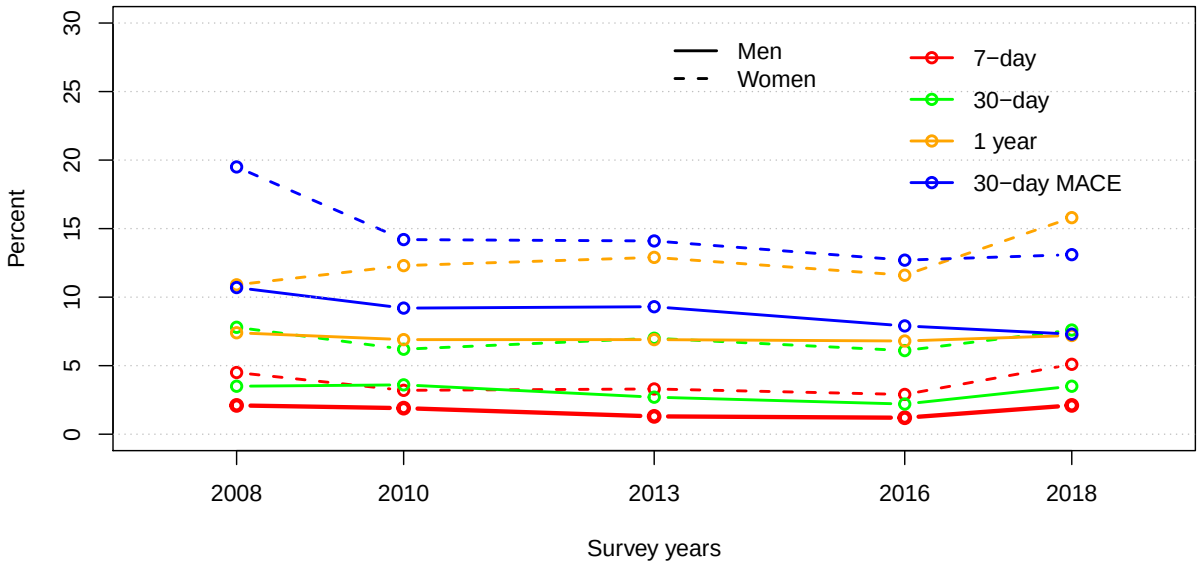


Table 2.14: Rates of Mortality and MACE[1] by ECG on Admission

	2008	2010	2013	2016	2018	p for trend
ST elevation						
n	761	776	748	712	711	
Mortality						
In-hospital	3.7	2.7	2.9	3.1	3.7	0.881
7-day	4.1	2.7	3.1	3.3	3.5	0.724
30-day	6.0	4.8	4.6	5.1	5.8	0.98
1 year	8.1	8.3	8.8	8.0	10.4	0.247
MACE[1]						
30-day	13.7	10.4	11.2	10.5	9.6	0.029
Non ST elevation						
n	985	1003	1137	1079	1067	
Mortality						
In-hospital	1.6	1.7	1.3	0.7	2.4	0.562
7-day	1.4	1.8	0.9	0.5	2.2	0.93
30-day	3.2	3.8	3.1	1.7	3.3	0.25
1 year	8.1	7.9	8.0	7.6	7.9	0.747
MACE[1]						
30-day	11.7	10.3	9.9	7.8	7.7	<0.001

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

Figure 2.8: Rates of Mortality and 30−day MACE
by ECG on Admission