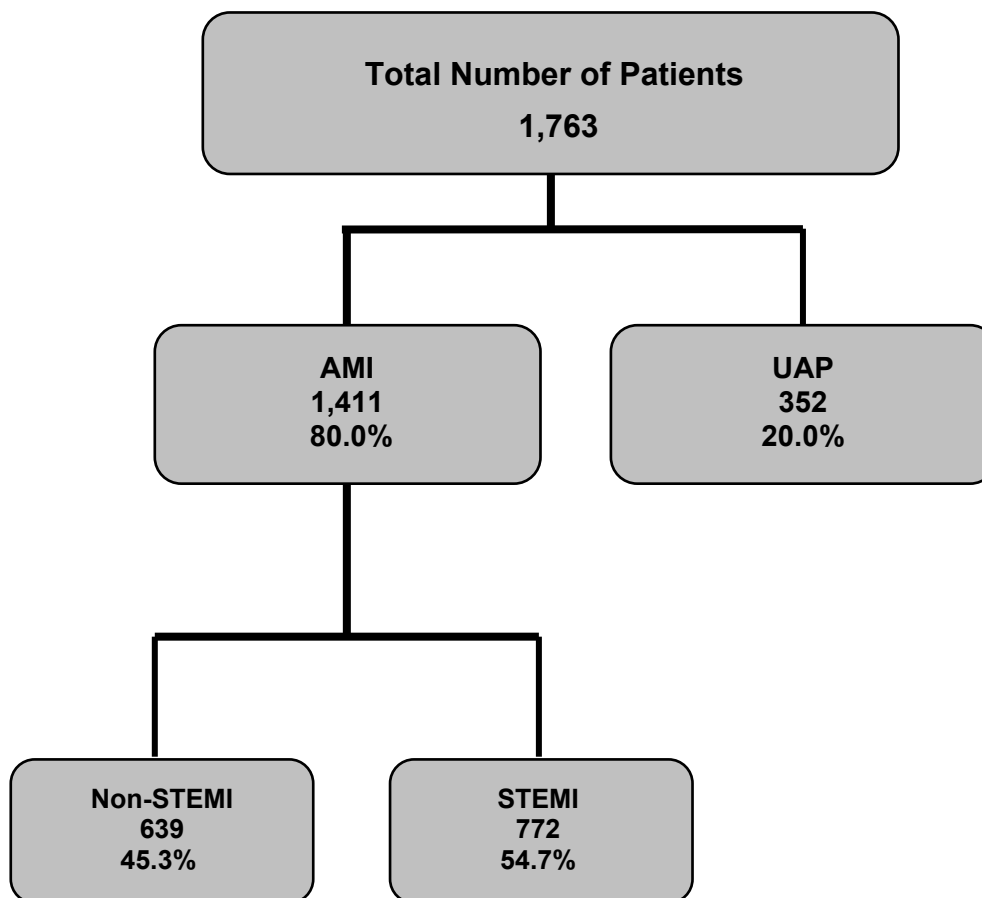


Chapter 2: Acute Coronary Syndrome by Discharge Diagnosis

2.1 Distribution of Patients with ACS by Discharge Diagnosis

Eighty percent of patients with ACS were diagnosed on discharge with AMI, and 20% with UAP. Among patients with a diagnosis of AMI on discharge, approximately 55% were STEMI and approximately 45% were Non-STEMI.

Figure 2.1: Distribution of Patients by Discharge Diagnosis



2.2 Demographic Characteristics

2.2.1 Age Distribution

The mean age and the age distributions of patients discharged with AMI and with UAP were similar. Among AMI patients, those with ST elevation were younger (mean age: 61.2) than those with non-ST elevation (mean age: 65.9).

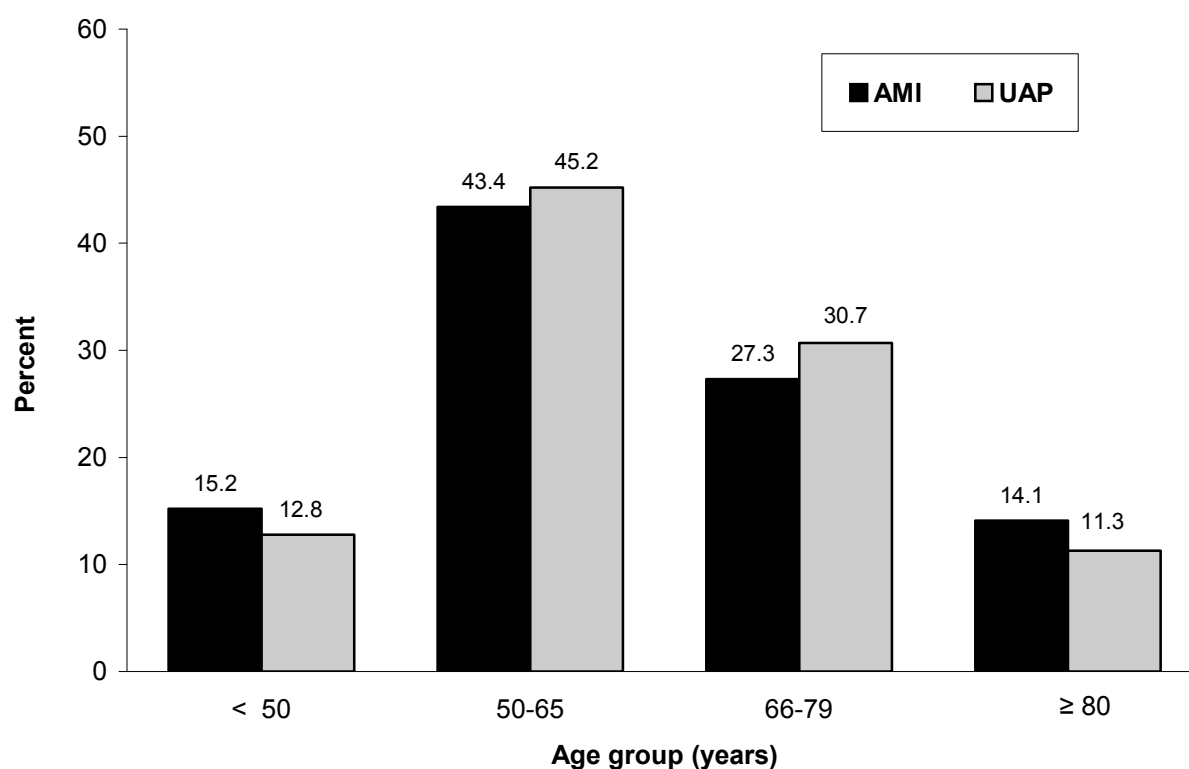
Table 2.1: Age Distribution**

Age group* (years)	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
< 50	18.8	10.8	15.2	12.8
50-65	47.3	38.7	43.4	45.2
66-79	23.3	32.1	27.3	30.7
≥ 80	10.6	18.5	14.1	11.3
Mean age ± SD*	61.2± 13.3	65.9± 13.3	63.3± 13.5	63.3± 12.1

* STEMI vs Non-STEMI; p<0.001

** Values in the tables represent percentages

Figure 2.2: Age Distribution



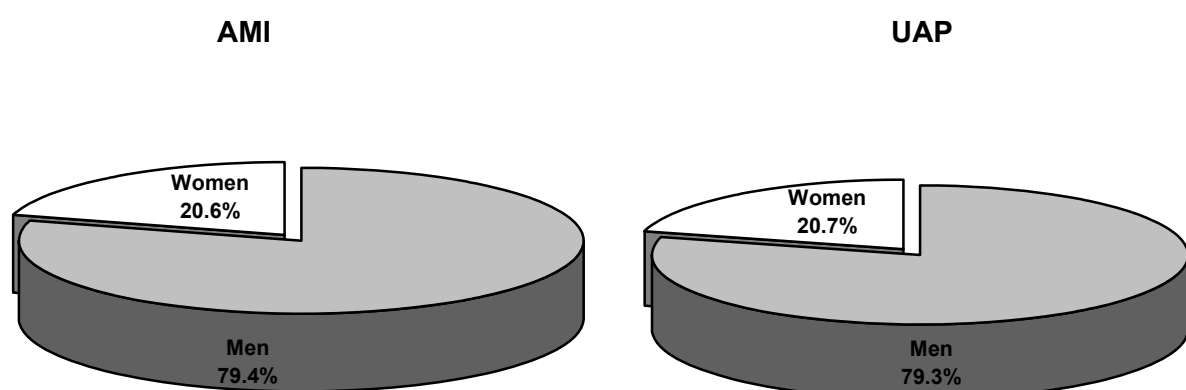
2.2.2 Sex Distribution

The sex distribution was similar among patients diagnosed with AMI and UAP. Among AMI patients, the proportion of women was slightly higher in patients with Non-STEMI than in patients with STEMI.

Table 2.2: Sex Distribution

Sex	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
Men	81.1	77.3	79.4	79.3
Women	18.9	22.7	20.6	20.7

Figure 2.3: Sex Distribution



2.3 Cardiovascular History and Risk Factors

2.3.1 Cardiovascular History

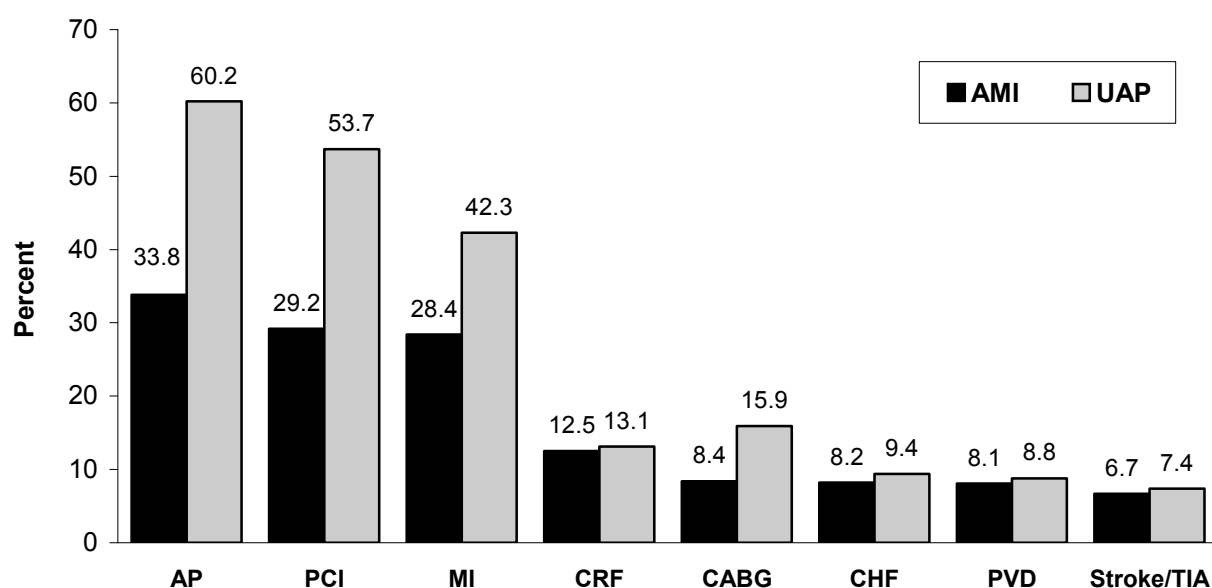
Patients diagnosed with UAP were more likely to have a history of previous angina and MI than patients diagnosed with AMI, and were more likely to have undergone PCI or CABG prior to the current event than those with AMI. Among AMI patients, those with Non-STEMI were more likely to have a history of MI, angina, chronic heart failure, chronic renal failure, and PVD than those with STEMI, and to have undergone PCI or CABG in the past.

Table 2.3: Cardiovascular History

CV history	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
MI ^{a,b}	21.5	36.7	28.4	42.3
AP ^{a,b}	23.4	46.4	33.8	60.2
PCI ^{a,b}	22.7	37.1	29.2	53.7
CABG ^{a,b}	3.1	14.7	8.4	15.9
CHF ^a	4.3	12.8	8.2	9.4
Stroke/TIA	5.8	7.8	6.7	7.4
Chronic renal failure ^a	7.5	18.6	12.5	13.1
PVD ^a	6.5	10.0	8.1	8.8

a: STEMI vs Non-STEMI, $p < 0.05$; b: AMI vs UAP, $p < 0.05$

Figure 2.4: Cardiovascular History*



* All graphs are presented according to descending order of patients with AMI

2.3.2 Risk Factors

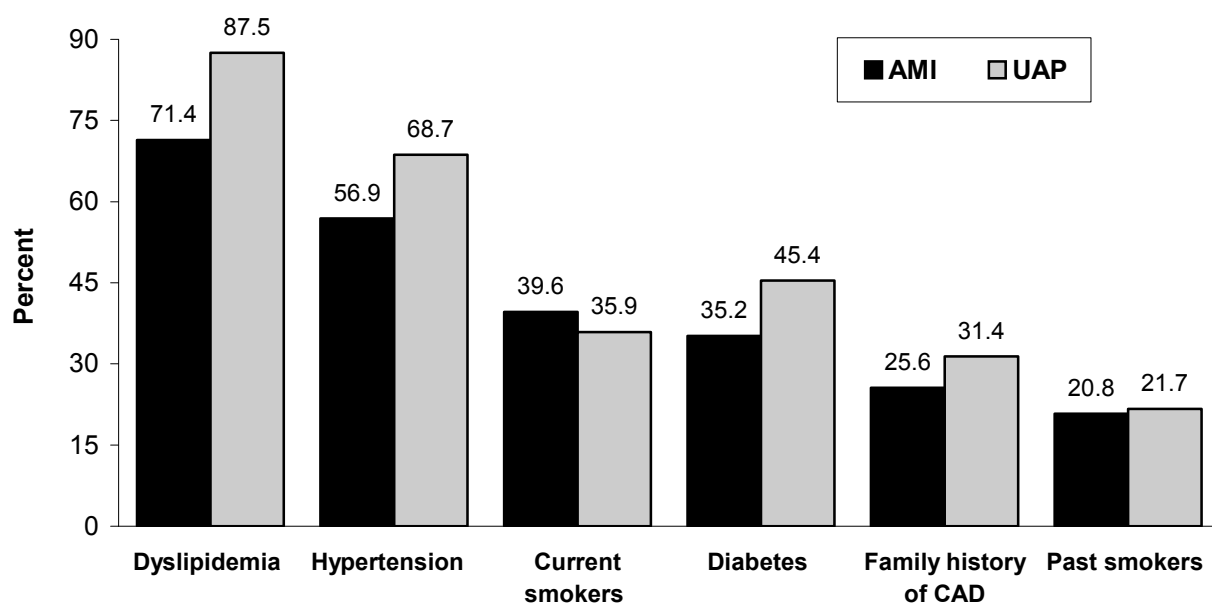
Hypertension, diabetes, dyslipidemia and family history of CAD were more prevalent among patients diagnosed with UAP than patients diagnosed with AMI. The proportion of newly diagnosed hypertension, diabetes and dyslipidemia was higher among patients with AMI than those with UAP. The prevalence of hypertension, diabetes and dyslipidemia was higher among Non-STEMI patients than STEMI patients. Current smoking was more prevalent among STEMI patients, and past smoking was more prevalent among Non-STEMI patients.

Table 2.4: Risk Factors

Risk factors	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
Hypertension ^{a,b}	48.8	66.6	56.9	68.7
Newly diagnosed *	3.5	3.3	3.4	2.9
Diabetes ^{a,b}	27.4	44.8	35.2	45.4
Newly diagnosed *	6.8	3.6	4.9	2.6
Dyslipidemia ^{a,b}	66.4	77.4	71.4	87.5
Newly diagnosed *	19.4	10.2	14.9	6.3
Current smokers ^a	47.7	29.9	39.6	35.9
Past smokers ^a	17.2	25.2	20.8	21.7
Family history of CAD ^b	27.4	23.4	25.6	31.4

a: STEMI vs Non-STEMI, $p < 0.05$; b: AMI vs UAP, $p < 0.05$; ** newly diagnosed expressed as percentage of total patients with specific risk factor

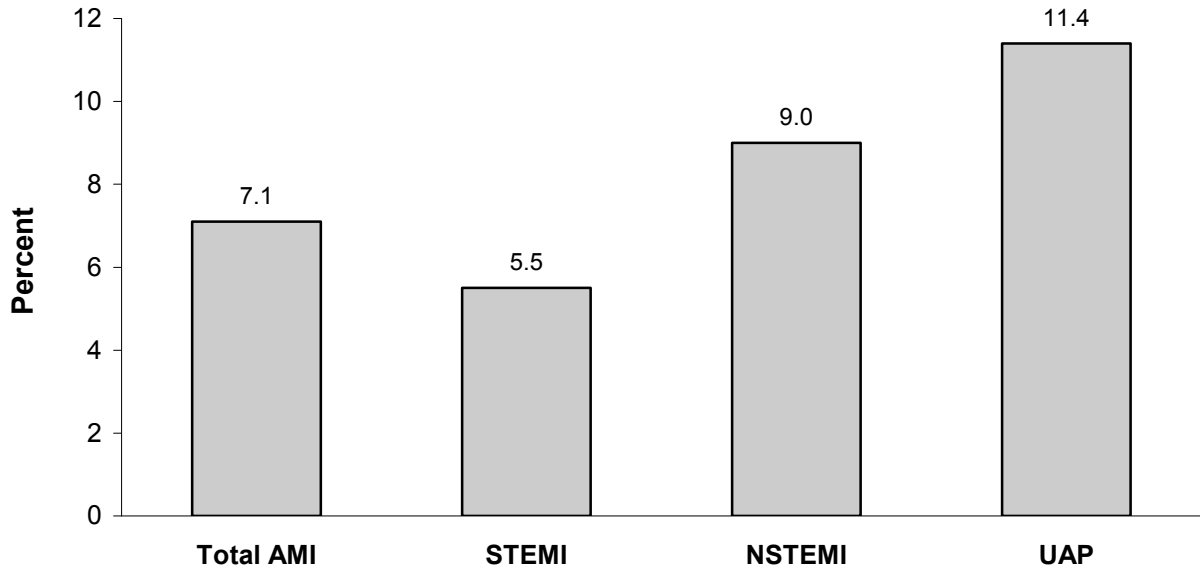
Figure 2.5: Risk Factors



2.3.3 Visit to ER during the Month Preceding Hospitalization

Patients with UAP were more likely to have visited the ER during the preceding month than those with MI. A greater proportion of Non-STEMI patients had visited the ER than STEMI patients in the month preceding the index hospitalization.

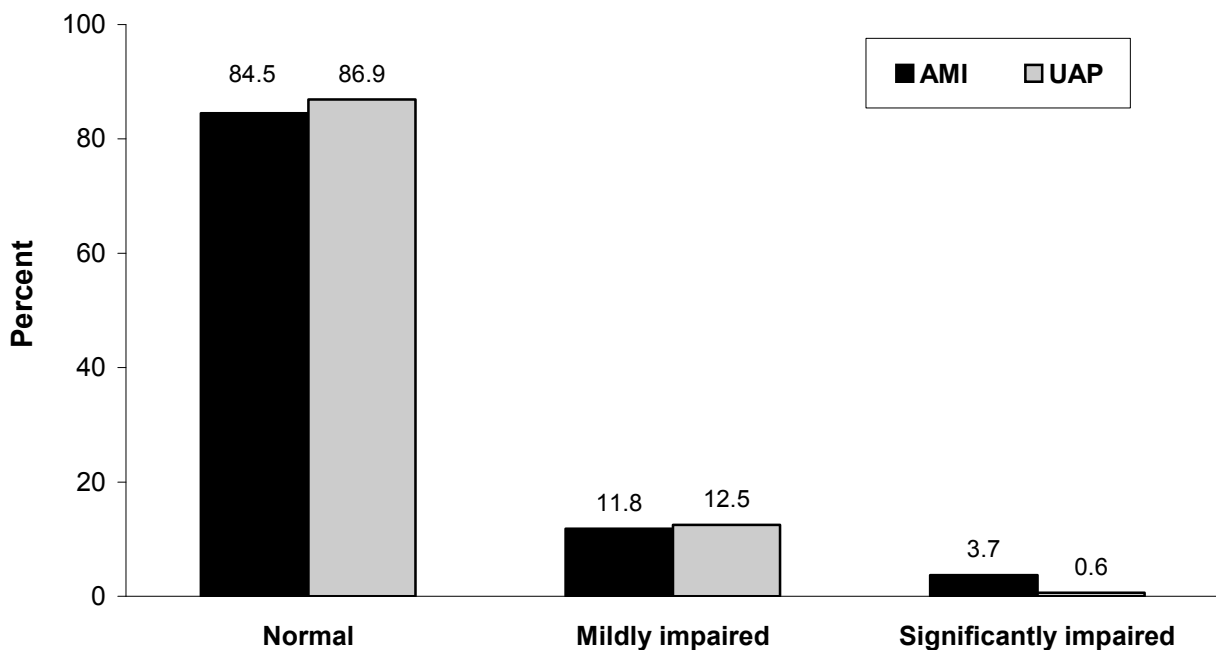
Figure 2.6: Visit to ER during Preceding Month



2.3.4 Patient's General Functional Level

Functional level was similar among AMI and UAP patients. The functional level of the majority of patients (85% of AMI patients and 87% of UAP patients) was normal.

Figure 2.7: Patient's General Functional Level



2.4 Pre-Admission and Admission Information

2.4.1 First Medical Contact

For approximately 40% of AMI patients and 52.4% of UAP patients, the first medical contact was in the ER. A greater proportion of AMI than UAP patients experienced their first medical contact in the ambulance. STEMI patients were more likely than Non-STEMI patients to experience their first medical contact in the ambulance.

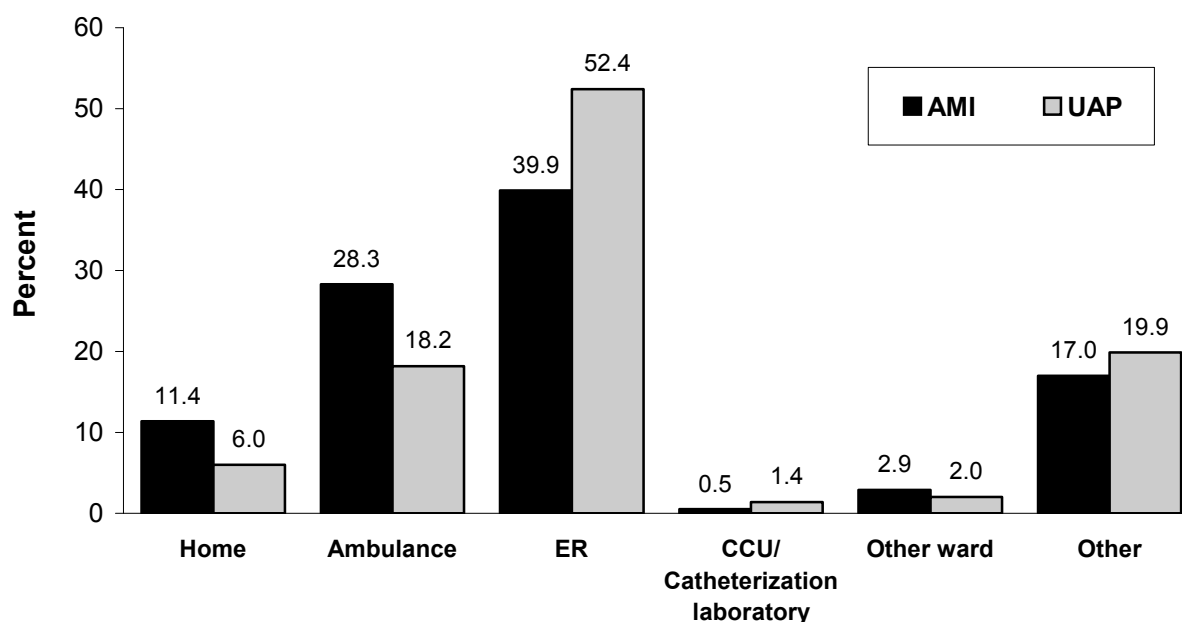
Table 2.5: First Medical Contact *

First medical contact ^{a,b}	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
Home	12.1	10.7	11.4	6.0
Ambulance	33.0	22.6	28.3	18.2
ER	36.0	44.6	39.9	52.4
CCU/ Catheterization laboratory	0.7	0.3	0.5	1.4
Other ward	2.4	3.4	2.9	2.0
Other **	15.8	18.4	17.0	19.9

*difference in place of first medical contact; a: STEMI vs Non-STEMI, $p < 0.05$; b: AMI vs UAP, $p < 0.05$

** refers largely to patients whose first medical contact was in a primary care setting

Figure 2.8: First Medical Contact



2.4.2 Presenting Symptoms

Presenting symptoms were similar among patients diagnosed with AMI and UAP, with the exception of arrhythmia, which was more frequent among patients with AMI. Non-STEMI patients were more likely to present with dyspnea and with atypical chest pain than were STEMI patients.

Table 2.6: Presenting Symptoms at First Medical Contact

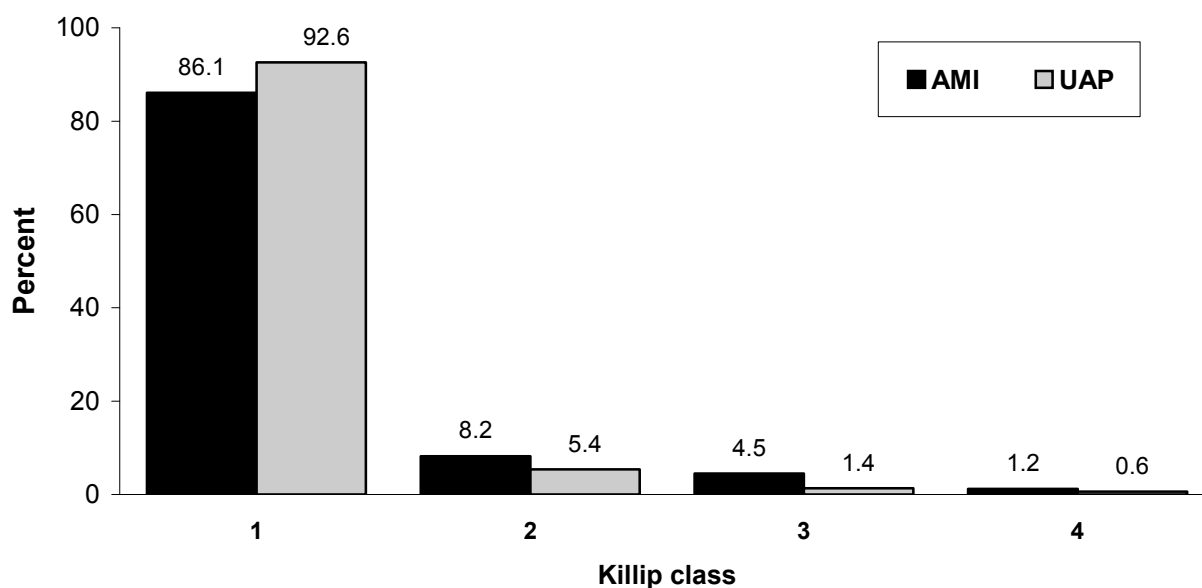
Symptoms	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
Typical angina ^a	88.6	83.1	86.1	85.2
Atypical chest pain ^a	7.0	10.5	8.6	11.4
Syncope/Aborted SCD	3.5	1.9	2.8	3.1
Arrhythmia ^b	5.2	3.9	4.6	2.3
Dyspnea ^a	24.4	33.0	28.3	25.9
Other ^b	15.7	16.3	15.9	10.2

a: STEMI vs Non-STEMI, $p < 0.05$; b: AMI vs UAP, $p < 0.05$

2.4.3 Killip Class

Patients with AMI were more likely than those with UAP to present with Killip class ≥ 2 .

Figure 2.9: Killip Class on Admission in all Patients



2.4.4 Treatment from Onset to Hospitalization

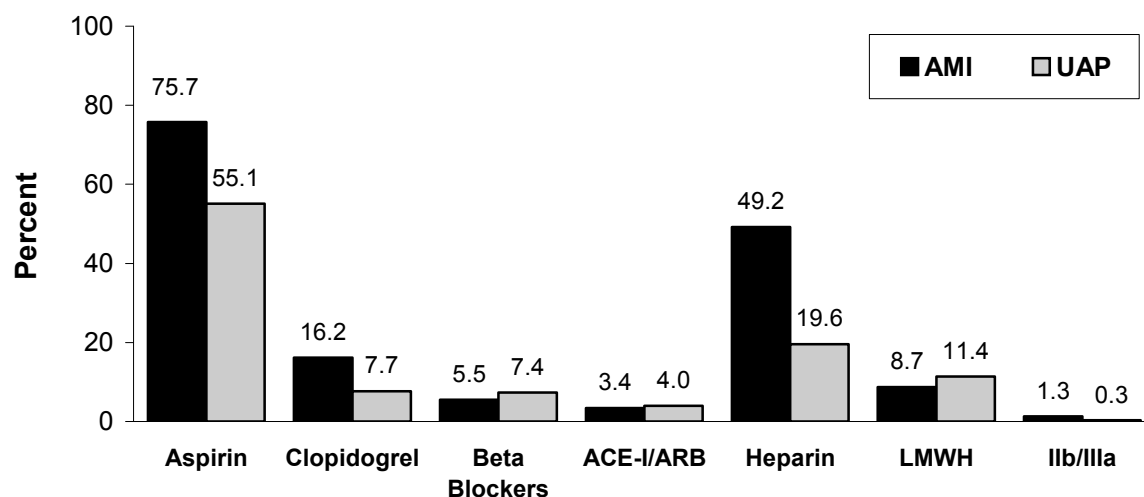
Patients with AMI were more likely than those with UAP to be treated with aspirin, clopidogrel, heparin and narcotics between onset and hospitalization. Among AMI patients, those with STEMI were more frequently treated with aspirin, clopidogrel, heparin, IIb/IIIa antagonists, narcotics and nitrates, and those with Non-STEMI received beta blockers and LMW heparin more frequently than those with STEMI.

Table 2.7: Treatment from Onset to Hospitalization

Treatment	AMI			UAP (N=352)
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	
Aspirin ^{a,b}	86.0	63.2	75.7	55.1
Clopidogrel ^{a,b}	19.7	12.1	16.2	7.7
Beta Blockers ^a	4.3	6.9	5.5	7.4
Diuretics ^a	3.9	11.7	7.4	8.5
ACE-I ^a	2.2	4.1	3.0	3.7
ARB	0.4	0.3	0.4	0.3
ACE-I/ARB	2.6	4.4	3.4	4.0
Heparin ^{a,b}	64.0	31.3	49.2	19.6
LMW heparin (fractionated) ^a	6.1	11.9	8.7	11.4
IIb/IIIa antagonists ^a	2.1	0.3	1.3	0.3
Narcotics ^{a,b}	33.3	11.7	23.5	8.0
Nitrates ^a	43.0	33.3	38.6	35.2
Antiarrhythmics	2.7	3.0	2.8	1.1

a: STEMI vs Non-STEMI, $p < 0.05$; b: AMI vs UAP, $p < 0.05$

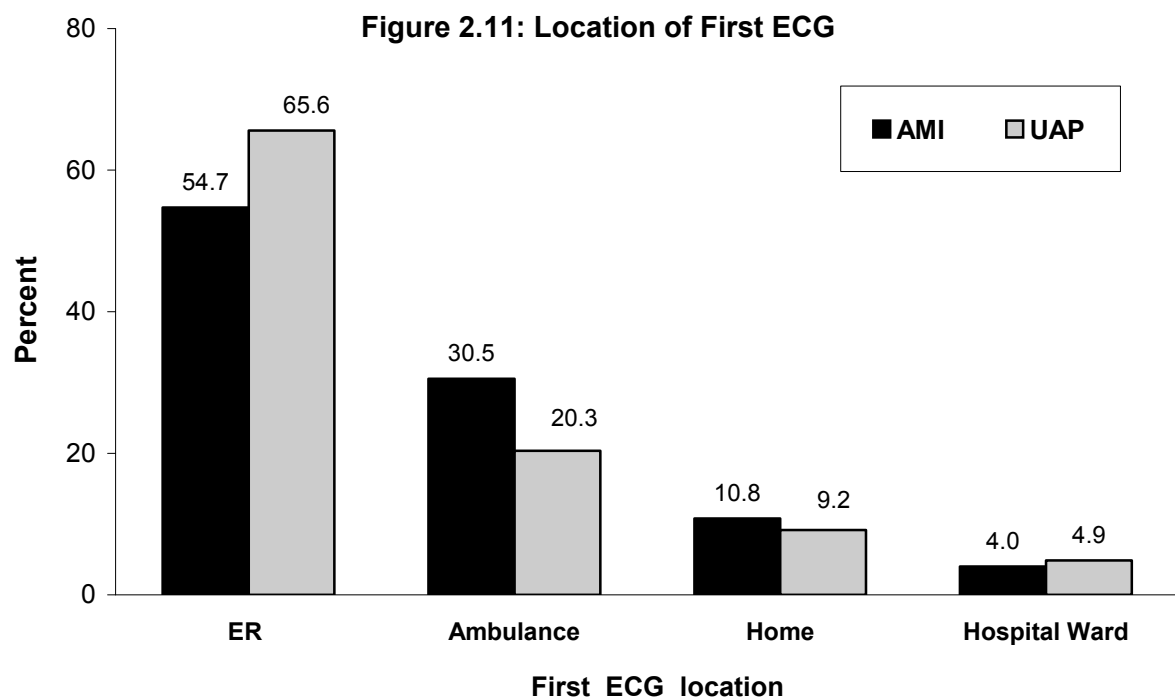
Figure 2.10: Treatment from Onset to Hospitalization



2.5 First Recorded ECG

2.5.1 Location of First ECG Recording

For the majority of patients (55% of AMI patients and 65.6% of UAP patients) the initial ECG was performed in the ER. A larger proportion of AMI patients (31%) than UAP patients (20.3%) underwent their first ECG in the ambulance.



2.5.2 First ECG Rhythm

The great majority of both AMI (92%) and UAP patients (93%) presented with normal sinus rhythm.

Table 2.8: First ECG Rhythm

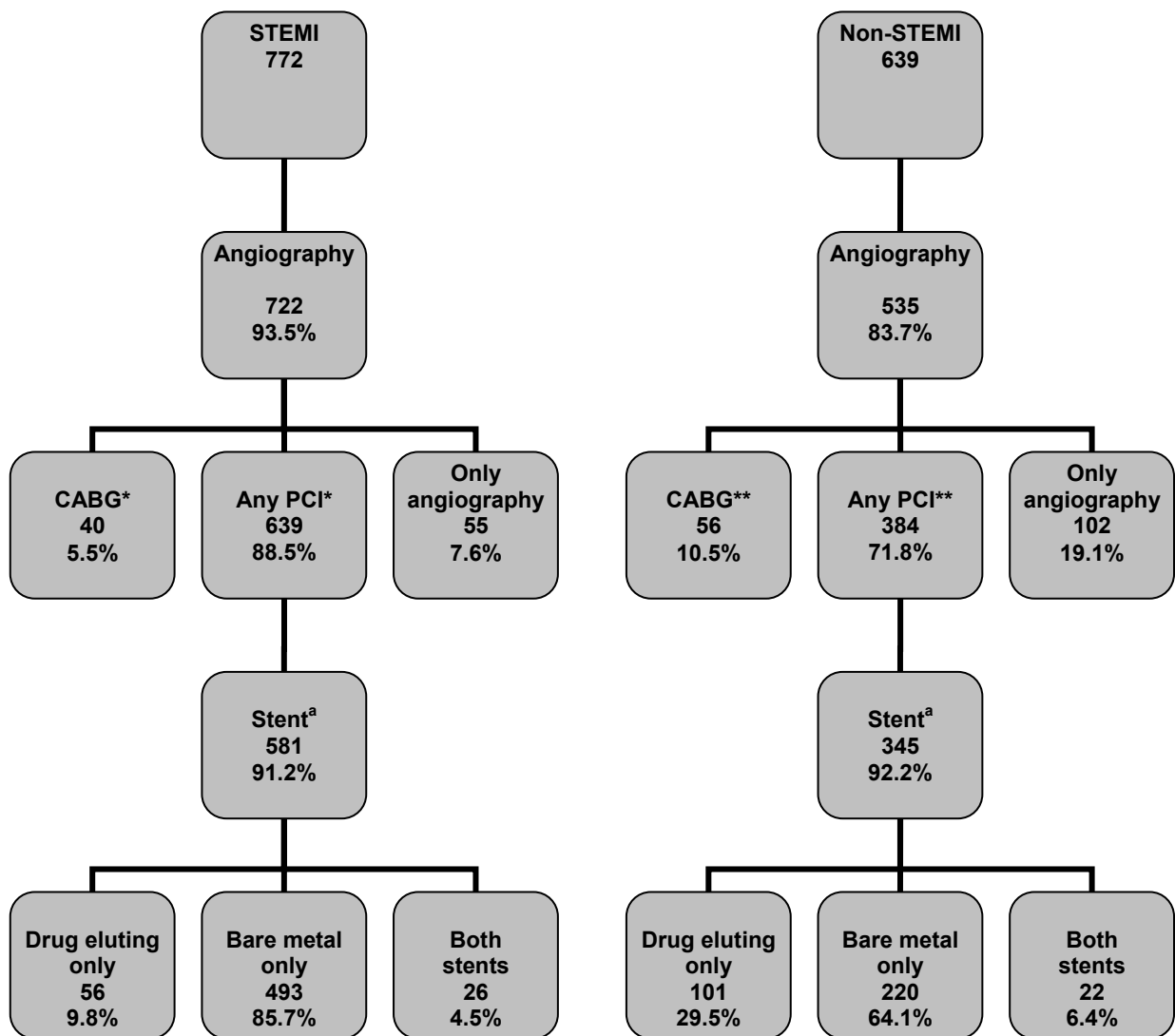
ECG rhythm	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
NSR	92.2	91.1	91.7	92.9
AF	3.8	4.7	4.2	4.0
SVT	0.0	0.3	0.1	0.6
VT/VF	0.5	0.2	0.4	0.3
Other	3.5	3.7	3.6	2.2

2.6 Coronary Interventions and Procedures during Hospitalization

2.6.1 Coronary Angiography and Interventions

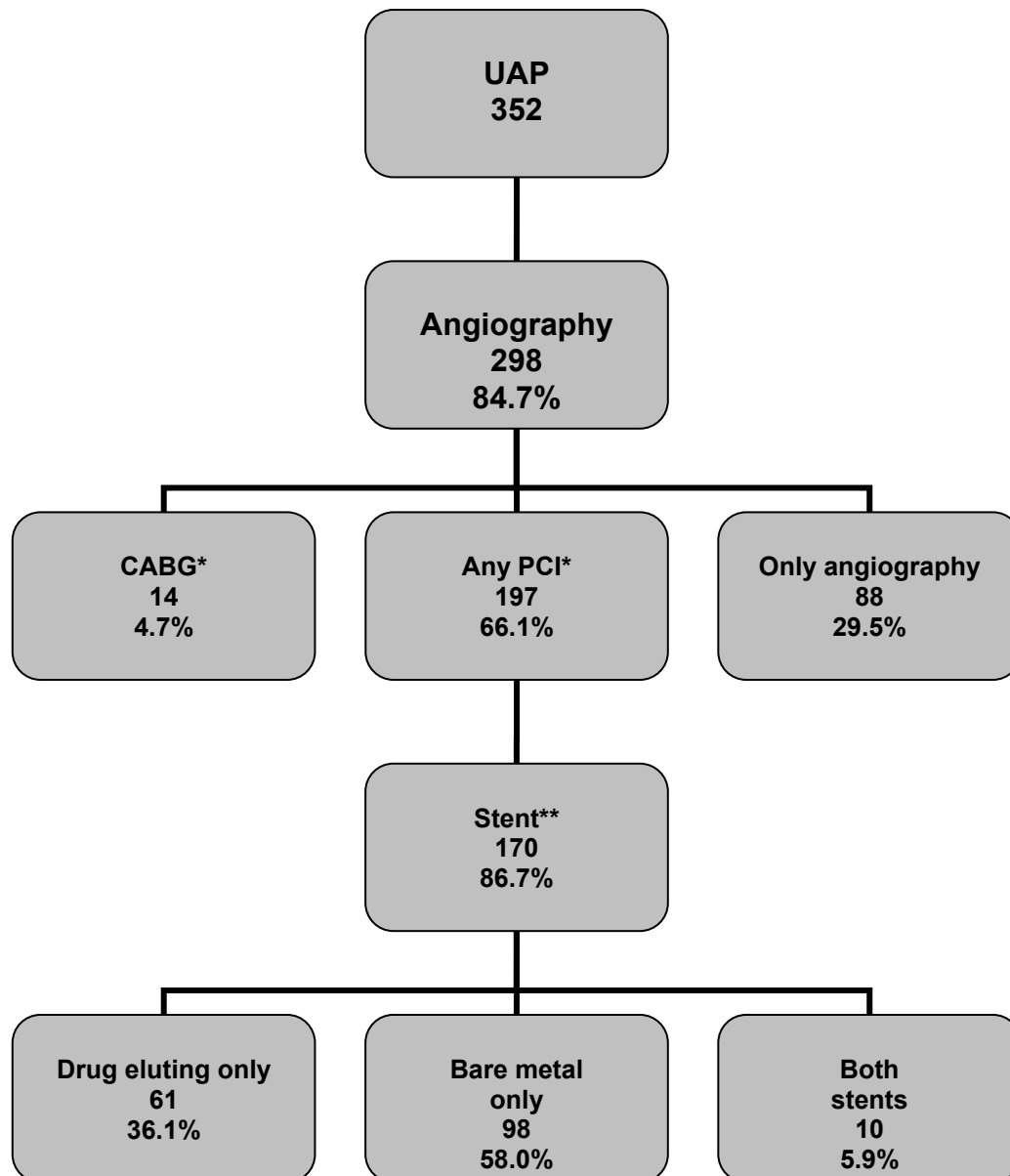
Among AMI patients, those with STEMI were more likely than those with non STEMI to undergo coronary angiography and PCI. CABG was performed more frequently among Non-STEMI patients than those with STEMI. Patients with UAP underwent cardiac interventions with less frequency than AMI patients. For the majority of patients, bare metal stents were employed. However, almost one third of Non STEMI and UAP patients received drug-eluting stents.

Figure 2.12: In-Hospital Cardiac Interventions and Procedures among AMI Patients



* 12 patients underwent both CABG and PCI; ** 7 patients underwent both CABG and PCI
 a. For a small number of patients type of stent is unknown

Figure 2.12-cont.: In-Hospital Cardiac Interventions and Procedures among UAP Patients



* One patient underwent both CABG and PCI; ** for one patient, type of stent is unknown

2.6.2 Other Procedures

Most procedures (DC shock, CPR, ventilation, IA balloon, ECHO and temporary pacemaker) were administered with greater frequency to patients with AMI than those with UAP. Stress tests were administered more frequently to patients with UAP than to those with AMI. Patients with STEMI underwent procedures more frequently than those with Non-STEMI.

Table 2.9: Other Procedures

Procedures	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
DC shock ^a	5.3	0.9	3.3	1.7
Resuscitation (CPR) ^{a,b}	5.2	1.4	3.5	0.3
Ventilation ^{a,b}	6.7	4.1	5.5	0.6
IA Balloon ^{a,b}	8.2	3.3	6.0	0.3
ECHO ^{a,b}	90.0	78.1	84.6	58.5
EPS ^a	0.6	0.0	0.4	0.3
Stress test/SPECT ^{a,b}	0.3	1.3	0.7	6.8
Permanent pacemaker	0.5	0.6	0.6	0.3
Temporary pacemaker ^{a,b}	4.8	1.1	3.1	0.0
Hypothermia for anoxic brain damage	0.0	0.2	0.1	0.0

a: STEMI vs Non-STEMI, $p < 0.05$; b: AMI vs UAP, $p < 0.05$

2.7 Ejection Fraction

Ejection fraction was determined in 83.1% of patients with AMI and in 70.1 percent of patients with UAP. A greater proportion of UAP patients presented with normal EF. Among AMI patients, normal EF was more frequent among those with Non-STEMI.

Table 2.10: Ejection Fraction

Ejection fraction	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
EF determined (%)	86.5	79.1	83.1	70.1
Normal ($\geq 50\%$)	37.6	52.9	44.2	68.6
Mild (40-49%)	36.0	26.1	31.8	16.3
Moderate (30-39%)	19.7	12.4	16.5	10.1
Severe ($< 30\%$)	6.7	8.6	7.5	5.0

2.8 In-Hospital Complications

Hemodynamic and electrical complications were more frequent in patients with AMI than those with UAP. Among AMI patients these complications were more frequent in STEMI vs Non-STEMI patients.

Table 2.11: In-Hospital Complications

Complications	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
CHF mild-moderate (Killip 2) ^b	9.2	7.4	8.4	4.8
Pulmonary edema (Killip 3) ^b	6.6	9.1	7.7	2.3
Cardiogenic shock (Killip 4) ^{a,b}	4.7	2.0	3.5	0.0
Hemodynamically significant RVI ^{a,b}	2.6	0.5	1.6	0.0
Re-MI ^b	2.1	1.4	1.8	0.3
Post MI angina /re-ischemia ^b	3.5	5.2	4.3	0.9
Sub-acute stent thrombosis ^b	1.7	0.8	1.3	0.0
Free wall rupture ^a	1.4	0.0	0.8	0.0
Pericarditis	0.9	0.2	0.6	0.0
Tamponade ^a	1.0	0.2	0.6	0.0
VSD	0.5	0.3	0.4	0.0
Moderate-severe MR ^b	1.8	2.2	2.0	0.3
RBBB (new onset)	1.9	1.1	1.6	0.3
LBBB (new onset)	0.5	0.9	0.7	0.6
High degree AVB ^{a,b}	4.4	0.6	2.7	0.3
Sustained VT ^{a,b}	2.8	0.6	1.8	0.3
Primary VF ^{a,b}	3.5	0.0	1.9	0.0
Secondary VF ^a	2.5	0.5	1.6	0.6
AF	6.2	5.3	5.8	4.0
Asystole ^{a,b}	3.4	1.4	2.5	0.3
TIA	0.1	0.3	0.2	0.0
Stroke	0.9	0.6	0.8	0.0
CVA/TIA in hospital	1.0	0.9	1.0	0.0
Acute renal failure	5.6	4.2	5.0	2.6
Major bleeding	1.9	1.7	1.8	0.6
Infection ^b	5.1	4.7	4.9	2.0

a: STEMI vs Non-STEMI, p<0.05; b: AMI vs UAP, p<0.05

2.9 In-Hospital Medical Treatment

Almost all AMI and UAP patients received aspirin, and approximately 94% of both groups received lipid-lowering drugs. AMI patients were more likely than UAP patients to receive unfractionated or regular heparin, clopidogrel and ACE Inhibitors/ARB. Hypoglycemic drugs and calcium antagonists were more frequently prescribed for UAP patients.

Table 2.12: In-Hospital Treatment

Treatment	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
Aspirin	97.4	97.8	97.6	97.7
Warfarin	4.7	4.1	4.4	3.1
Heparin (unfractionated/regular) ^{a,b}	48.1	29.5	39.7	24.6
LMW heparin (fractionated) ^a	41.3	61.4	50.4	48.6
Clopidogrel ^{a,b}	92.4	87.6	90.2	83.2
ACE-I ^b	71.8	69.1	70.6	58.2
ARB ^{a,b}	4.7	10.1	7.1	11.1
ACE-I/ARB ^b	75.6	77.4	76.4	68.2
IIb/IIIa antagonists ^{a,b}	50.0	19.9	36.4	9.7
Aldosterone receptor antagonist ^a	6.2	3.6	5.0	3.7
Beta Blockers	82.5	83.5	83.0	78.7
IV inotropic agent ^{a,b}	5.2	2.7	4.0	0.3
Digoxin	2.3	2.5	2.4	1.1
Diuretics ^a	24.4	34.4	28.9	31.0
Insulin ^a	10.3	19.4	14.4	15.7
Hypoglycemic drugs (Oral) ^{a,b}	9.5	18.6	13.6	21.0
Statins	93.9	93.3	93.6	93.2
Fibrate ^b	4.7	5.5	5.1	8.0
Ezetimibe ^{a,b}	0.4	1.4	0.9	2.9
LLD	95.3	94.2	94.8	94.0
Calcium antagonists ^{a,b}	12.1	22.2	16.7	31.4
Nitrates ^a	23.1	31.0	26.7	31.3
Other drugs	70.9	69.3	70.2	71.0

a: STEMI vs Non-STEMI, p<0.05; b: AMI vs UAP, p<0.05

2.10 Duration of Hospitalization

The median length of stay in the CCU was one day longer for patients with AMI (4 days) than for those with UAP (3 days). Median length of total hospital stay was two days longer for AMI patients than UAP patients.

Table 2.13: Length of Stay in CCU

Days	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
Median	4.0	4.0	4.0	3.0
Interquartile range (25%-75%)	(3.0-6.0)	(3.0-5.0)	(3.0-6.0)	(2.0-4.0)

Table 2.14: Length of Total Hospital Stay

Days	AMI			UAP
	STEMI (N=772)	Non-STEMI (N=639)	Total (N=1,411)	(N=352)
Median	5.0	5.0	5.0	3.0
Interquartile range (25%-75%)	(4.0-7.0)	(3.0-6.0)	(4.0-7.0)	(2.0-5.0)

2.11 Medical Treatment on Discharge

Most of the "recommended drugs"* were given more frequently to AMI patients.

Diuretics, insulin, hypoglycemic drugs, nitrates and calcium antagonists were prescribed more frequently for patients with UAP.

Table 2.15: Medical Treatment on Discharge among Hospital Survivors

Recommended treatment	AMI			UAP
	STEMI (N=742)	Non-STEMI (N=625)	Total (N=1,367)	(N=352)
Aspirin	96.8	96.0	96.4	95.2
Warfarin	5.7	5.2	5.4	3.7
LMW heparin ^b	9.8	8.4	9.2	5.2
Clopidogrel ^{a,b}	87.1	76.2	82.1	70.9
ACE-inhibitors ^{a,b}	72.5	66.5	69.8	58.5
ARB ^a	5.3	10.3	7.6	10.6
ACE/ARB ^b	77.3	76.8	77.1	68.5
Aldosterone ^a	6.9	3.6	5.4	5.2
Beta Blockers ^b	83.4	82.5	83.0	77.5
IV inotropic agent	0.4	0.2	0.3	0.0
Digoxin	1.2	2.3	1.7	0.6
Diuretics ^{a,b}	17.9	28.5	22.8	28.4
Insulin ^{a,b}	5.4	10.6	7.8	11.7
Hypoglycemic drugs ^{a,b}	12.5	21.6	16.7	23.9
Statins ^a	94.2	90.7	92.6	92.6
Fibrate ^b	4.3	6.3	5.2	9.2
Ezetimibe ^a	0.8	2.1	1.4	2.3
LLD ^a	95.6	91.3	93.6	93.8
Calcium antagonists ^{a,b}	12.3	22.0	16.7	31.9
Nitrates ^{a,b}	4.3	11.4	7.6	12.9
Other drugs	58.8	62.2	60.4	61.4

a: STEMI vs Non-STEMI, $p < 0.05$; b: AMI vs UAP, $p < 0.05$

* Heparin, clopidogrel, ACE/ARB, beta blockers and lipid-lowering drugs

2.12 Re-Hospitalization within 30 Days of Admission

Re-hospitalization rates were higher for patients with AMI (18.9%) than for those with UAP (15.3%). AMI patients were more likely to be rehospitalized following an urgent cardiac event (43.7%), and UAP patients were more likely to be rehospitalized for a scheduled procedure (51% of all rehospitalizations).

Table 2.16: Re-hospitalization within 30 Days of Admission

	AMI			UAP
	STEMI (N=742)	Non-STEMI (N=625)	Total (N=1,367)	(N=352)
Rehospitalized (%)	18.0	19.9	18.9	15.3
Reason for Re-hospitalization				
Scheduled	26.8	38.1	32.2	51.0
Urgent Cardiac event	44.9	42.4	43.7	35.3
Non-cardiac hospitalization	28.3	19.5	24.1	13.7

2.13 Mortality and Major Adverse Coronary Event (MACE)

Unadjusted 7-day and 30-day mortality rates were considerably higher for patients diagnosed with AMI than for those diagnosed with UAP, and highest among those with STEMI. After adjustment for age and other risk factors, 7-day mortality rates were 4 times higher for AMI than UAP patients (although statistical significance was borderline) and 30-day mortality was almost 7 times higher for AMI patients. Among AMI patients, 7-day mortality rates were 4.6 times higher and 30-day mortality was 2.5 times higher among those with STEMI compared with Non-STEMI patients.

Unadjusted rates of Major Adverse Coronary Event (MACE), which includes recurrent MI, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up) or death occurring within 30 days from admission, were 3 times higher for patients diagnosed with AMI than those diagnosed with UAP. Among AMI patients, unadjusted rates of MACE were similar among STEMI and Non-STEMI patients, however after adjustment for age and other risk factors, MACE was found to be 1.5 times higher in STEMI patients.

Figure 2.13: Unadjusted 7-Day and 30-Day Mortality Rates

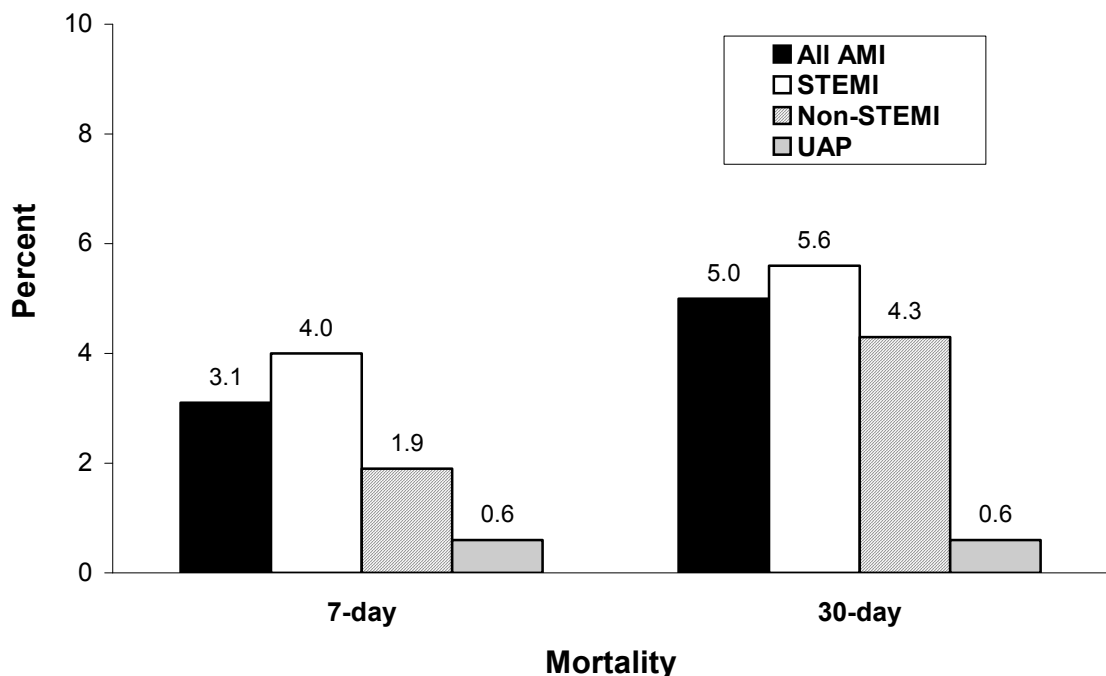


Figure 2.14: Unadjusted Rates of MACE

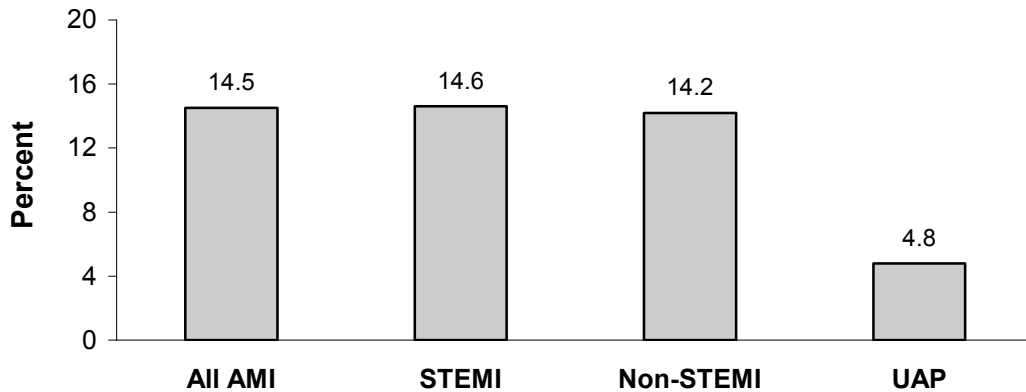


Table 2.17: Rates of Mortality and MACE by Discharge Diagnosis Adjusted for Age and Other Risk Factors

	All AMI (N=1,411)* (%)	UAP (N=352)* (%)	Age-Adjusted OR (95% CI)	Risk Factor Adjusted OR** (95% CI)
7-day	3.0	0.6	5.19 (1.24-21.6)	4.09 (0.97-17.3)
30-day	4.9	0.6	8.70 (2.11-35.9)	6.85 (1.63-28.7)
MACE***	14.4	5.0	3.35 (2.00-5.59)	3.29 (1.96-5.54)

* age adjusted

** adjusted for age, gender, past MI, diabetes, hypertension, Killip class \geq 2, any angiography

*** definition includes: recurrent MI, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up) or death occurring within 30 days from hospitalization.

Table 2.18: AMI patients: Rates of Mortality and MACE by Type of MI Adjusted for Age and Other Risk Factors

	STEMI (N=772)* (%)	Non STEMI (N=639)* (%)	Age-Adjusted OR (95% CI)	Risk Factor Adjusted OR** (95% CI)
7-day	4.7	1.6	3.07 (1.54-6.13)	4.60 (2.08-10.20)
30-day	6.6	3.5	1.92 (1.15-3.21)	2.53 (1.39-4.61)
MACE***	16.2	13.2	1.28 (0.94-1.74)	1.52 (1.09-2.12)

* age adjusted

** adjusted for age, gender, past MI, diabetes, hypertension, Killip class \geq 2, any angiography

*** definition includes: recurrent MI, recurrent ischemia, stent thrombosis, ischemic stroke, urgent revascularization (follow-up) or death occurring within 30 days from hospitalization.