Kuwait Acute Coronary Syndromes Registry: Baseline Characteristics, Management Practices and In-Hospital Outcomes of Patients Hospitalized with Acute Coronary Syndromes in Kuwait

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Key Words

Myocardial infarction • Unstable angina • Acute coronary syndromes • Middle East • Kuwait • Risk factors • Registry

Abstract

Objectives: To identify the characteristics of patients with acute coronary syndromes (ACS), their hospital management and in-hospital outcomes, through a prospective registry system in Kuwait. **Subjects and Methods:** A registry involving all 7 general hospitals in Kuwait was set up. Consecutive patients diagnosed as having ACS over a period of 6 months were enrolled. **Results:** Of 2,129 patients enrolled, 718 (34%) had ST segment elevation myocardial infarction (STEMI), 576 (27%) non-ST segment elevation myocardial infarction (NSTEMI) and 835 (39%) unstable angina (UA). Thrombolytic therapy was used in 556 (77%) patients with STEMI. The median time from diagnostic electrocardiogram to administration of thrombolytic therapy was 38 min. Almost all patients with ACS (2,050, 96%) received aspirin during hospitalization. Only a minority received clopidogrel, 18 (3%) STEMI, 36 (6%) NSTEMI and 96 (12%) UA patients. The use of glycoprotein IIb/IIIa antagonists was minimal (38 patients, 2%). β -Blockers were used in 1,473 (69%) patients,

while 982 (46%) received angiotensin-converting enzyme inhibitors. Coronary angiography during hospitalization was performed in 119 (17%), 120 (21%) and 126 (15%) patients with STEMI, NSTEMI and UA, respectively. In-hospital mortality occurred in 31 (4%) myocardial infarction patients and 4 (0.5%) UA patients ($p < 0.0001$). **Conclusion:** This registry has enabled us to determine the incidence and characteristics of ACS patients in Kuwait. It has also enabled us to identify some barriers that we need to overcome for the full implementation of published guidelines for the management of patients with ACS.

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Introduction

Acute coronary syndromes (ACS) are a leading cause of mortality and morbidity, both in Western and developing countries. The past decade has witnessed considerable progress in the treatment options for patients with ACS. Management guidelines are published to provide clinicians with evidence-based treatment strategies, proved to decrease the mortality and morbidity of patients with ACS, and improve both in-hospital and long-

Table 1. Baseline characteristics and risk factors of patients

	STEMI (n = 718)	NSTEMI (n = 576)	UA (n = 835)	p value
Age, years	52.9 ± 12.1	59.5 ± 12.5	55.8 ± 11.3	<0.001
Age				
<55 years	435 (61)	225 (39)	403 (48)	<0.001
55–74 years	241 (33)	276 (48)	382 (46)	<0.001
≥75 years	41 (6)	75 (13)	50 (6)	<0.001
Men	634 (88)	419 (73)	563 (67)	<0.001
Previous MI	131 (18)	200 (35)	255 (31)	<0.001
Current smoker	378 (53)	192 (33)	289 (35)	<0.001
Diabetes mellitus	292 (41)	317 (55)	420 (50)	<0.001
Hypertension	223 (31)	334 (58)	494 (59)	<0.001
Hyperlipidemia	124 (17)	236 (41)	382 (46)	<0.001

Age values are presented as means ± SD. Figures in parentheses are percentages.

term outcomes for these patients [1, 2]. However, there are limited data about the implementation of these guidelines into clinical practice in Kuwait. There are also limited data on the nature and distribution of ACS in Kuwait and the Middle East. Therefore, we set up the Kuwait Acute Coronary Syndromes (KACS) Registry, a prospective registry of all patients with ACS admitted to hospitals throughout Kuwait during a 6-month period. The objectives of the KACS Registry were to identify clinical and demographic characteristics, management practices and in-hospital outcomes of patients with ACS in Kuwait.

Subjects and Methods

The 7 general hospitals in Kuwait that admit ACS patients participated in this registry. These hospitals are Mubarak Al-Kabeer, Al-Amiri, Al-Adan, Al-Farwaniya, Al-Jahra, Al-Sabah and Kuwait Oil Company. At each hospital, designated physicians prospectively identified consecutive patients admitted with ACS over a period of 6 months, from December 2003 through May 2004. Several variables were collected, including patients' demographics, past medical history, diagnosis on admission, vital signs at presentation, diagnostic electrocardiogram (ECG), peak creatine kinase enzyme and creatine kinase MB isoenzyme, peak cardiac troponin I, blood sugar, fasting serum lipids, diagnosis on discharge, in-hospital and discharge medications, in-hospital outcomes including recurrent ischemia, reinfarction, heart failure and cardiogenic shock, and in-hospital mortality. Hypertension was defined by one of the following criteria: history of hypertension diagnosed and treated with medication, diet and/or exercise; blood pressure greater than 140 mm Hg systolic or 90 mm Hg diastolic on at least 2 occasions; current use of antihypertensive therapy. Hyperlipidemia was defined as having a history of elevated cholesterol and triglycerides diagnosed and/or treated by a physician. Data forms were checked for completeness at a nation-

al coordinating center and were returned for corrections to the participating hospitals when necessary.

The diagnosis of different types of ACS was based on the definitions of the American College of Cardiology (ACC) [3]. Cardiac biomarkers were measured locally at each hospital laboratory, using its own assays and reference ranges. Patient care at each participating hospital was performed according to usual practice, independent of the KACS Registry. For the diagnosis of unstable angina (UA) to be made, the following criteria were necessary. (1) Clinical presentation: angina that occurred at rest and was prolonged, usually lasting more than 20 min; new-onset angina of at least Canadian Cardiovascular Society (CCS) class III severity or recent acceleration of angina reflected by an increase in severity of at least 1 CCS class to at least CCS class III. (2) The biochemical cardiac markers had to be within the normal range or slightly elevated, but not reaching the range at which myocardial infarction (MI) occurs. (3) The ECG at presentation had to have ST segment depression or T wave inversion; if there were no ECG changes at presentation, then one of the following was required: a history of MI, positive exercise stress test or previous angiogram showing significant coronary artery disease.

Statistical Analysis

Baseline and clinical characteristics of patients were presented as frequencies and means. Continuous variables were compared using the Mann-Whitney U test and categorical variables were compared using the Z-test of proportion; a value of $p < 0.05$ was considered statistically significant. All data analyses were carried out using SPSS, version 10.0.

Results

Patient Characteristics

Of the 2,129 patients enrolled, the final discharge diagnosis was ST segment elevation MI (STEMI) in 718 patients (34%), non-ST segment elevation MI (NSTEMI) in

576 (27%) and UA in 835 (39%). The baseline characteristics and risk factors of the patients are listed in table 1. Compared to other ACS patients, those diagnosed as having STEMI were significantly younger, more often male and often cigarette smokers, but less often with a history of diabetes, hypertension or hyperlipidemia. A history of previous MI was more frequent among the patients with NSTEMI (200, 35%) and UA (255, 31%), than among those with STEMI (132, 18%).

There was a good agreement between the provisional diagnosis on admission and the final diagnosis at discharge in patients with STEMI and UA. However, in most patients with NSTEMI, the final diagnosis did not match the provisional admission (fig. 1).

Management Practices

The in-hospital and discharge medications are shown in table 2. During the first 24 h of hospitalization, 2,050 (96%) patients with ACS received aspirin and 150 (7%) received clopidogrel. Unfractionated heparin was used in 1,732 (81%) patients, mostly in those with STEMI. A small number of patients (171, 13%) received low-molecular-weight heparin. The use of glycoprotein IIb/IIIa antagonists was minimal (38, 2%). The prescription of β -blockers at discharge was higher (1,631, 77%) than that of angiotensin-converting enzyme (ACE) inhibitors (1,149, 54%).

Of 718 patients with STEMI, 556 (77%) received thrombolytic therapy. Among STEMI patients eligible for thrombolytic therapy (hospital presentation within 12 h of symptom onset in the absence of contraindications for thrombolysis), the thrombolysis rate was 91%. The median time from the first diagnostic ECG to administration of thrombolytic therapy was 38 min.

Noninvasive and invasive diagnostic and therapeutic procedures during hospitalization are shown in figure 2. Coronary angiography was performed more frequently in patients with NSTEMI (120, 21%) compared to those with STEMI (119, 17%) or UA (126, 15%). We identified 118 (6%) patients with non-ST segment elevation ACS, considered to be at high risk for future cardiac events. These patients had ST segment depression on the diagnostic ECG, left ventricular failure at presentation and elevated troponin levels. Only 18 (15%) of these high-risk patients were transferred for coronary angiography during their hospital stay.

Hospital Outcomes

In-hospital outcomes are listed in table 3. The mortality rate was 4% for MI patients and 0.5% for UA patients

Fig. 1. Relation between provisional diagnosis on admission and final diagnosis at hospital discharge. RSCP NYD = Retrosternal chest pain not yet diagnosed; LVF = left ventricular failure.

Fig. 2. Procedures during hospital stay.

($p < 0.0001$). Similarly, complications were more common among patients diagnosed as having MI compared to those diagnosed as having UA. Recurrent ischemia and congestive heart failure occurred more frequently in pa-

Table 2. Medications during first day of hospital stay and at discharge

	STEMI (n = 718)	NSTEMI (n = 576)	UA (n = 835)	p value
In-hospital				
Aspirin	704 (98)	550 (96)	796 (95)	0.009
Clopidogrel	18 (3)	36 (6)	96 (12)	<0.001
Unfractionated heparin	655 (91)	467 (81)	610 (73)	<0.001
LMWH	35 (5)	81 (14)	155 (19)	<0.001
Tirofiban	4 (1)	25 (4)	9 (1)	<0.001
β-Blocker	500 (70)	362 (63)	611 (73)	<0.001
ACE inhibitor	332 (46)	269 (47)	382 (46)	0.938
AIIRB	4 (1)	13 (2)	41 (5)	<0.001
Nitrates	551 (77)	515 (89)	768 (92)	<0.001
Calcium blocker	29 (4)	100 (17)	175 (21)	<0.001
Statin	499 (70)	439 (76)	607 (73)	0.03
Spironolactone	12 (2)	20 (4)	30 (4)	0.05
At hospital discharge				
Aspirin	670 (98)	517 (94)	779 (94)	0.02
Clopidogrel	40 (6)	81 (15)	139 (17)	0.001
Unfractionated heparin	49 (7)	56 (10)	44 (5)	0.005
LMWH	21 (3)	33 (6)	37 (5)	0.044
β-Blocker	576 (84)	407 (74)	648 (78)	<0.001
ACE-inhibitor	437 (64)	310 (56)	402 (48)	<0.001
AIIRB	6 (1)	19 (3)	54 (7)	<0.001
Nitrates	508 (74)	461 (83)	681 (82)	<0.001
Calcium blocker	55 (8)	145 (26)	225 (27)	<0.001
Statin	394 (57)	370 (67)	528 (64)	<0.001
Other lipid lowering	188 (27)	100 (18)	145 (17)	<0.001
Spironolactone	23 (3)	22 (4)	33 (4)	0.716

Figures in parentheses are percentages. LMWH = Low-molecular-weight heparin; ACE = angiotensin-converting enzyme; AIIRB = angiotensin II receptor blocker.

Table 3. Hospital outcomes

	STEMI (n = 718)	NSTEMI (n = 576)	UA (n = 835)	p value
Recurrent ischemia	130 (18)	131 (23)	129 (5)	0.002
Infarction	25 (4)	14 (2)	4 (1)	<0.001
CHF	65 (9)	81 (14)	22 (3)	<0.001
Ventilation	32 (5)	26 (5)	6 (1)	<0.001
Inotrope	43 (6)	24 (4)	8 (1)	<0.001
Cardiogenic shock	35 (5)	17 (3)	4 (1)	<0.001
Pacing	16 (2)	3 (1)	0 (0)	<0.001
Stroke	2 (0.3)	2 (0.3)	1 (0.1)	0.657
VT/VF requiring Trx	39 (5)	11 (2)	1 (0.1)	<0.001
AF/SVT requiring Trx	19 (3)	22 (4)	12 (1)	<0.001
Major bleed	8 (1)	4 (1)	1 (0.1)	<0.001
Hospital mortality	31 (4)	23 (4)	4 (1)	<0.001
Median length of hospital stay, days	6	6	4	<0.001

Figures in parentheses are percentages. CHF = Congestive heart failure; VT/VF = ventricular tachycardia/fibrillation; Trx = treatment; AF/SVT = atrial fibrillation/supraventricular tachycardia.

tients with NSTEMI, while reinfarction and cardiogenic shock resulted more frequently in patients with STEMI. Stroke was a rare event in all patients with ACS. The median length of hospital stay was 6 days for both STEMI and NSTEMI patients and 4 days for patients with UA.

Discussion

This is the first prospective nationwide registry undertaken in Kuwait, in which the full spectrum of ACS is represented. Because all hospitals in Kuwait that admit ACS patients participated in this registry, the delivered data are presumed to accurately portray patient characteristics and clinical practice in Kuwait. Since this registry was conducted in 2004, it has the advantages of enrolling patients according to the new MI definition utilizing troponin, and of reporting on the use of medications advised by the latest ACC/American Heart Association (AHA) guidelines [1, 2].

When compared to patients from developed countries, our ACS patients are about a decade younger [4, 5]. This can be explained partly by the fact that in Kuwait, population structure is young [6]. The prevalence of reported history of diabetes in Kuwait is about twice that reported from registries of North America and Europe [5, 7], reflecting the relatively high prevalence of diabetes in Kuwait [8].

This registry provided an opportunity to explore the relationship between provisional diagnosis on admission and final diagnosis at hospital discharge. In contrast to patients with STEMI, those with NSTEMI were often not diagnosed accurately at the time of admission (fig. 1). Thus, improvement in early diagnostic assessment and risk stratification is needed for patients presenting with NSTEMI.

It is recommended in the ACC/AHA guidelines of 2004 [1] that patients with STEMI or new left bundle branch block receive aspirin and be reperfused by either thrombolysis or primary percutaneous coronary intervention within 30 min of presentation to the hospital. The use of β -blockers, ACE inhibitors and statins is also recommended within 24 h of MI diagnosis [1]. Thrombolysis is the primary method of reperfusion in hospitals in Kuwait. In this study, there was a high rate of use of thrombolytic therapy, 91% of the thrombolysis-eligible group received such therapy. Only 9% of the eligible patients did not receive reperfusion therapy, contrary to 30% in the Global Registry of Acute Coronary Events (GRACE) [5] and 24% in the US National Registry of

Myocardial Infarction [4]. There are several possible explanations for this difference in practice. The fact that our patients are young and less at risk of bleeding from thrombolytic therapy may cause the treating physicians to be less hesitant in administering such therapy. Another possible explanation is the fact that the critical care units (CCUs) in Kuwait are managed by cardiologists and not internists.

However, there was a considerable in-hospital delay in administering this treatment to our patients. The median time from the first diagnostic ECG to thrombolysis was 38 min. In a previous registry, carried out in 2002, thrombolytic therapy was administered in the CCUs [9]. In the current registry, most hospitals administered thrombolytic therapy in the emergency departments rather than CCUs. We believe that this resulted in shortening the time interval for thrombolysis administration by 7 minutes. However, it remains an unacceptably long time interval. The door-to-needle time needs to be shortened substantially to maximize the benefit of thrombolytic therapy. Improving the time lag from arrival at the hospital to thrombolysis administration would require coordinated efforts by the emergency medical system, the emergency departments and cardiology divisions of the hospitals concerned.

As recommended in the ACC/AHA guidelines of 2002 for the management of non-ST elevation ACS [2], patients should receive aspirin, some form of heparin, clopidogrel and β -blockers [2]. In addition, high-risk patients should receive a glycoprotein IIb/IIIa antagonist and undergo coronary angiography. A substantial proportion of ACS patients in our registry, including the high-risk non-ST segment elevation ACS subgroup, did not undergo in-patient coronary angiography. This may be explained by the unavailability of onsite catheterization laboratories at the participating hospitals. Studies have shown that hospitals without onsite catheterization laboratories have lower rates of coronary angiography and percutaneous coronary intervention [10]. The availability of only one catheterization facility serving all of Kuwait limits the use of coronary angiography.

The use of well-established treatments like aspirin, some form of heparin, β -blockers and ACE inhibitors was acceptable and in concordance with the guidelines [1, 2]. However, the use of clopidogrel and glycoprotein IIb/IIIa antagonists was very low. The delay between recommendations of the guidelines and the implementation of new therapies into routine clinical practice is well recognized and may explain the low rate of use of these 2, comparatively newer, therapies [11].

The 4% hospital mortality noted in this study for STEMI and NSTEMI patients is comparable to the 6–8% reported in Western registries [11]. The reason for this relatively low hospital mortality, despite high rate of diabetes, is not clear. Possible explanations include younger age and high rate of use of reperfusion (thrombolytic) therapy in this study population.

The main limitation of this registry is the absence of long-term follow-up and the absence of follow-up of patients who were referred to catheterization during their hospital stay.

Conclusion

This registry has enabled us to determine the incidence and characteristics of ACS patients in Kuwait. It has also enabled us to identify some barriers that we need to overcome for the full implementation of published guidelines for the management of patients with ACS.

Acknowledgments

We would like to thank Merck Sharp and Dohme and the Kuwait Oil Company for their financial support to the KACS Registry. We would also like to thank Miss Rihab Moneer for her help in the editorial preparation of the manuscript.

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