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Baseline Characteristics of a Patient Cohort and Predictors of In-hospital MORtality in CORonary Care Units (MORCOR-TURK) Trial in Türkiye

Türkiye'de Koroner Yoğun Bakım Ünitelerindeki Hastane İçi Mortalite (MORCOR-TURK) Çalışmasında Hasta Temel Karakteristikleri ve Öngördürücüleri

ABSTRACT

Objective: The MORtality in CORonary Care Units in Türkiye (MORCOR-TURK) trial is a national registry evaluating predictors and rates of in-hospital mortality in coronary care unit (CCU) patients in Türkiye. This report describes the baseline demographic characteristics of patients recruited for the MORCOR-TURK trial.

Methods: The study is a multicenter, cross-sectional, prospective national registry that included 50 centers capable of 24-hour CCU service, selected from all seven geographic regions of Türkiye. All consecutive patients admitted to CCUs with cardiovascular emergencies between September 1-30, 2022, were prospectively enrolled. Baseline demographic characteristics, admission diagnoses, laboratory data, and cardiovascular risk factors were recorded.

Results: A total of 3,157 patients with a mean age of 65 years (range: 56-73) and 2,087 (66.1%) males were included in the analysis. Patients with arterial hypertension [1,864 patients (59%)], diabetes mellitus (DM) [1,184 (37.5%)], hyperlipidemia [1,120 (35.5%)], and smoking [1,093 (34.6%)] were noted. Non-ST elevation myocardial infarction (NSTEMI) was the leading cause of admission [1,187 patients (37.6%)], followed by ST elevation myocardial infarction (STEMI) in 742 patients (23.5%). Other frequent diagnoses included decompensated heart failure (HF) [339 patients (10.7%)] and arrhythmia [272 patients (8.6%)], respectively. Atrial fibrillation (AF) was the most common pathological rhythm [442 patients (14%)], and chest pain was the most common primary complaint [2,173 patients (68.8%)].

Conclusion: The most common admission diagnosis was acute coronary syndrome (ACS), particularly NSTEMI. Hypertension and DM were found to be the two leading risk factors, and AF was the most commonly seen pathological rhythm in all hospitalized patients. These findings may be useful in understanding the characteristics of patients admitted to CCUs and thus in taking precautions to decrease CCU admissions.

Keywords: Coronary care unit, baseline characteristics, MORCOR-TURK

ÖZET

Amaç: MORCOR-TURK çalışması, Türkiye'deki koroner yoğun bakım ünitelerinde (KYBÜ) hastane içi ölümün öngörücülerini ve oranlarını değerlendiren ulusal bir kayıt sistemidir. Bu rapor, MORCOR-TURK çalışmasına dahil edilen hastaların temel demografik özelliklerini sunmaktadır.

Yöntem: Çalışma, Türkiye'nin yedi coğrafi bölgesinden seçilen, 24 saat KYBÜ hizmeti verebilen 50 merkezi içeren, çok merkezli, kesitsel, ileriye dönük ve ulusal bir kayıt çalışmasıdır. 1-30 Eylül 2022 tarihleri arasında kardiyovasküler acil durumlarla KYBÜ'lere kabul edilen tüm ardışık hastalar ileriye dönük olarak kaydedildi. Temel demografik özellikler, kabul tanıları, laboratuvar verileri ve kardiyovasküler risk faktörleri kaydedildi.

Bulgular: Analize 65 yaş ortalamasıyla (56-73) ve 2087'si (%66,1) erkek olan toplam 3157 hasta dahil edildi. Arteriyel hipertansiyon [1864 hasta (%59)], diabetes mellitus (DM) [1184 (%37,5)], hiperlipidemi [1120 (%35,5)] ve sigara içme alışkanlığı [1093 (%34,6)] olan hastalar belirlendi. KYBÜ'ye kabulün önde gelen nedeni non-ST elevation myokard infarktüsü (NSTEMI) idi [1187 hasta (%37,6)] ve ST elevation myokard infarktüsü (STEMI) 742 hastada (%23,5) tesbit edildi. Diğer en sık tanılar ise sırasıyla dekompanse Kalp yetersizliği [339 hasta (%10,7)] ve aritmi [272 hasta (%8,6)] idi. Atriyal fibrilasyon en yaygın patolojik ritim [442 hasta (%14)] ve göğüs ağrısı en yaygın temel şikayetti [2173 hasta (%68,8)].

ORIGINAL ARTICLE
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Sonuç: En sık başvuru tanısı, NSTEMI başta olmak üzere, akut koroner sendrom idi. Hipertansiyon ve diyabet en sık görülen risk faktörleri iken başvuran tüm hastalarda en sık görülen patolojik ritim AF idi. Bu veriler KYBÜ'ye yatırılan hastaların özelliklerinin tanınması ve dolayısıyla KYBÜ'ye başvuruların azaltılması için gerekli önlemlerin alınmasında faydalı olabilir

Anahtar Kelimeler: Koroner yoğun bakım ünitesi, temel karakteristikler, MORCOR-TURK

Cardiovascular-related disorders continue to be the leading cause of mortality worldwide, despite significant technological and medical advancements.[1] Coronary care units (CCUs) are specialized facilities designed to provide intensive care and monitoring for individuals with life-threatening heart conditions, including myocardial infarction and other cardiac pathologies. While CCUs have contributed to a decline in mortality and morbidity rates associated with cardiac causes, mortality remains a significant concern in these units. This underscore the need for the development of new methods and precautions to further reduce mortality rates.[2]

Several factors contribute to mortality in CCUs. Firstly, acute coronary syndrome (ACS) itself is associated with a high risk of mortality, especially in cases of ST-segment elevation myocardial infarction (STEMI), where immediate reperfusion therapy is crucial.[3] Patients with pre-existing comorbidities such as diabetes, hypertension, or renal disease carry an increased mortality risk due to the presence of additional cardiovascular risk factors and potential complications. Additionally, mortality in CCUs is a complex and multifactorial outcome influenced by various patient-related factors, disease severity, treatment strategies, and overall healthcare management.[4] Therefore, evaluating timely and appropriate interventions and understanding the clinical characteristics of patients are imperative.

Rapid assessment, accurate diagnosis, and the implementation of evidence-based therapies, including medications and invasive procedures such as percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG), significantly improve outcomes and reduce mortality rates in CCUs. Various scores such as Killip, Global Registry of Acute Coronary Events (GRACE), and Thrombolysis In Myocardial Infarction (TIMI), have been developed to aid in assessing mortality risk.[5] However, it is important to note that these scores may not be applicable to all CCU patients and that mortality rates can still be high even in cases of low scores. Furthermore, population differences can influence the interpretation of these scores.

Different countries have shared their CCU data, including information on patient follow-up. Due to variations in demographic features, therapeutic approaches, and socioeconomic situations, mortality rates have shown variability across different countries. Moreover, previous studies have primarily focused on acute coronary syndrome (ACS) patients.[6-8] Obtaining more data from distinct countries can provide a more objective approach to improving outcomes and determining more accurate therapies for CCU patients. However, it is worth mentioning that comprehensive CCU data from Türkiye, consisting of a prospective, multicenter study

ABBREVIATIONS

ACS	Acute Coronary Syndrome
AF	Atrial Fibrillation
AH	Arterial Hypertension
CABG	Coronary Artery Bypass Grafting
CAD	Coronary Artery Disease
CCUs	Coronary Care Units
DM	Diabetes Mellitus
ECG	Electrocardiogram
HF	Heart Failure
LVEF	Left Ventricular Ejection Fraction
MORCOR-TURK	MORtality in CORonary Care Units in Türkiye
NSTEMI	Non-ST Elevation Myocardial Infarction
PAD	Peripheral Artery Disease
PCI	Percutaneous Coronary Intervention
STEMI	ST-Segment Elevation Myocardial Infarction
USAP	Unstable Angina Pectoris

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with a large sample, has not yet been shared. Considering this, we have organized a novel study entitled "MORtality predictors in CORonary Care Units in Türkiye" (MORCOR-TURK) to define patient characteristics, mortality predictors, and conduct detailed analyses of different populations with all diagnoses related to cardiovascular pathology from all regions of Türkiye.[9]

Materials and Methods

Study Design

The MORCOR-TURK trial, a multicenter, prospective, cross-sectional, and non-interventional study, was registered on clinicaltrials.gov with the number NCT05296694. A total of 50 CCUs from all geographical regions of Türkiye (7 regions) were included in the study. Patient characteristics and short-term outcomes were obtained during the one-month follow-up period. The study was approved by the Afyonkarahisar University of Health Sciences Clinical Research Ethics Committee (Approval Number: 2011-KAEK-2, Date: 05.08.2022) and adhered to the good clinical practice protocol and the Declaration of Helsinki principles. Written informed consent was obtained from all participants or their relatives.

Study Population

Baseline characteristics, including demographic features, risk factors, past medical history, hemodynamic grade, and laboratory findings of patients hospitalized in CCUs between September 1 and 30, 2022, were obtained consecutively. The minimum age threshold was 18 years, and the diagnoses included acute heart failure (HF), ACS, cardiogenic shock, tachyarrhythmia and bradyarrhythmia, and myopericarditis. Arterial hypertension (AH), diabetes mellitus (DM), smoking status, chronic kidney disease, family history of coronary artery disease (CAD), peripheral artery disease (PAD), hyperlipidemia, and the presence and medical history of HF were also assessed and recorded for all patients. In addition, physical examinations of the patients were conducted by cardiologists at admission.

AH was considered when the systolic blood pressure was higher than 140 mmHg and/or diastolic blood pressure was higher than 90 mmHg or if the patient was undergoing antihypertensive treatment. DM was defined as a fasting glucose level higher than 126 mg/dL, a level higher than 200 mg/dL at any time, or the use of anti-diabetic treatment.[10] Smoking was defined as consuming at least one cigarette per day.

All patients were followed in the CCU and given appropriate medical or interventional therapy according to current guidelines. In-hospital adverse events and medical status were recorded. Adverse events were defined as death, arrhythmic events including ventricular and atrial tachycardias and atrioventricular blocks, acute renal failure, any type of bleeding, and hemorrhagic stroke.

Exclusion Criteria

Patients who refused hospitalization or were discharged from the CCUs within four hours of hospitalization, those hospitalized for reasons other than cardiovascular causes, those admitted to the CCU for elective procedures including coronary intervention, peripheral artery intervention, and transcatheter valve interventions, and those who died within half an hour secondary to unsuccessful cardiopulmonary resuscitation (CPR) were excluded.

Clinical Diagnoses

The ACS diagnosis was established by following the European Society of Cardiology guidelines. At least a two-millimeter ST-elevation in at least two contiguous leads or a suspected new left bundle branch block on a 12-lead electrocardiogram (ECG) was considered indicative of STEMI. If symptoms consisted of myocardial ischemia with no ST-elevation and high troponin levels on a 12-lead ECG, then a non-ST elevation myocardial infarction (NSTEMI) diagnosis was made. If the troponin level was normal, unstable angina pectoris (USAP) was diagnosed.[11,12] Acute HF was considered when HF symptoms started rapidly or gradually. Atrial fibrillation (AF) diagnosis was made when the electrocardiogram (ECG) showed irregular R-R intervals accompanying indistinct P waves. Ventricular tachycardia was identified when premature ventricular extrasystoles exceeded thirty seconds on the ECG. Bradyarrhythmia was diagnosed when the heart rate was lower than 60 beats per minutes, accompanied by atrioventricular blockage.[13] Cardiogenic shock was defined if hypotension and signs of end-organ hypoperfusion occurred together. As clinically diagnosed diseases, myopericarditis was diagnosed when signs of myopericardial inflammation arose, such as supported by laboratory findings and imaging modalities including cardiac magnetic resonance imaging and echocardiography in patients with typical or atypical symptoms. Coronary angiography and/or percutaneous intervention were performed based on the interventional cardiologist's decision, either immediately, urgently, or electively if patients were stable, to diagnose or exclude coronary artery disease.

Blood Analysis

Routine biochemistry, complete blood count, cardiac biomarkers, and lipid parameters were obtained at admission and analyzed. Troponin I and creatine kinase-MB levels were measured at 8-hour intervals from admission.

Transthoracic Echocardiographic Evaluation

Two-dimensional M-mode echocardiography was performed for all patients using the Philips EPIQ 7 ultrasound system. Left ventricular dimensions and wall thicknesses were obtained. Left ventricular ejection fraction (LVEF) was calculated using the modified Simpson's method.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) 23.0 version software package (Chicago, IL, USA) was used for analysis. After fifty CCU centers were identified as participants in the study, stratified sampling, along with the random sampling method, was used according to the weights of the centers. The power analysis of the study was performed using G Power 3.1.9.2. software (Universität Kiel, Germany). Considering an α type error rate of 0.005 and a power of 0.95, in addition to an approximately 10% mortality rate in the literature, at least 1,092 participants needed to be included in the study (effect size was 0.5).

A two-tailed *P* value of ≤ 0.05 was considered statistically significant. The Kolmogrov-Smirnov test examined the normality distribution of variables, and Levene's test assessed the homogeneity of variances. Mean ± standard deviation, interquartile ranges, and percentage schemes were used for normally distributed continuous variables, non-normally distributed variables, and categorical variables, respectively. The

categorical variables were tested using the Chi-square test. The two-tailed Student's t-test and the Mann-Whitney U test were used for parameters that were normally distributed and non-normally distributed, respectively.

Results

A total of 3,157 patients were included in the study. The mean age was 65 years (range: 56-73), and 2,087 (66.1%) of the participants were male. AH was diagnosed in 1,864 patients (59%), diabetes mellitus in 1,184 (37.5%) patients, hyperlipidemia in 1,120 (35.5%) patients, and smoking in 1,093 (34.6%) patients. In terms of the main admission diagnosis, NSTEMI was the leading diagnosis with 1,187 (37.6%) patients, followed by STEMI, which was the second most frequently encountered diagnosis with 742 (23.5%) patients. Other frequent diagnoses were decompensated HF (339 patients (10.7%)) and arrhythmia (272 patients (8.6%)), respectively. The number of patients with cardiac arrest was relatively low, with 19 patients (0.6%) (Figure 1, Table 1).

When patients were divided into two groups – those with ACS and those with other diagnoses – a male predominance, younger age, higher rates of active smoking, and AH were observed in the ACS group. Conversely, the rate of DM and previous CAD was higher in the group with other diagnoses (Table 2).

The most common cardiac rhythm among patients was sinus rhythm. AF [442 patients (14%)] was the most common pathological rhythm, followed by atrioventricular block [77 patients (2.4%)], and only 28 patients had pacemaker rhythm (0.9%) (Table 1). Additionally, AF rhythm was significantly higher in the ACS group (Table 2). In terms of medications at admission, angiotensinogen-converting enzyme inhibitors/angiotensin receptor blockers were the most commonly used drugs [1,419 patients (44.9%)], followed by beta-blockers [1,420 patients (45%)] and acetylsalicylic acid [1,330 patients (42.1%)] (Table 1).

As for the chief complaint at admission, chest pain was the most common [2,173 patients (68.8%)]. Dyspnea [572 patients (18.1%)], palpitation [147 patients (4.7%)], and syncope/presyncope [127 patients (4%)] were the subsequent complaints (Table 1, Figure 2).

Table 1. Main Diagnosis, Admission Rhythm, and Complaints of Patients

Main Admission Diagnosis	All Patients
STEMI, n (%)	742 (23.5)
NSTEMI, n (%)	1187 (37.6)
USAP, n (%)	355 (11.2)
Acute Pulmonary Edema, n (%)	99 (3.1)
Decompensated HF, n (%)	339 (10.7)
Arrhythmia, n (%)	272 (8.6)
Cardiac Arrest, n (%)	19 (0.6)
Critical Limb Ischemia, n (%)	4 (0.1)
Interventional Complication, n (%)	7 (0.2)
Other, n (%)	133 (4.2)
Admission Rhythm	
Sinus Rhythm, n (%)	2537 (80.4)
Atrial Fibrillation, n (%)	442 (14)
Other SVTs, n (%)	23 (0.7)
AV Block, n (%)	77 (2.4)
Ventricular Tachycardia, n (%)	35 (1.1)
Ventricular Fibrillation, n (%)	8 (0.3)
Cardiac Arrest (Asystole), n (%)	7 (0.2)
Pacemaker Rhythm, n (%)	28 (0.9)
Admission Complaint	
Chest Pain, n (%)	2173 (68.8)
Dyspnea, n (%)	572 (18.1)
Syncope/Presyncope, n (%)	127 (4)
Palpitation, n (%)	147 (4.7)
Sudden Death, n (%)	18 (0.6)
Acute Ischemic Leg Pain, n (%)	2 (0.1)
Other, n (%)	118 (3.7)

HF, heart failure; STEMI, ST-elevated myocardial infarction; NSTEMI, Non-ST elevated myocardial infarction; USAP, unstable angina pectoris;

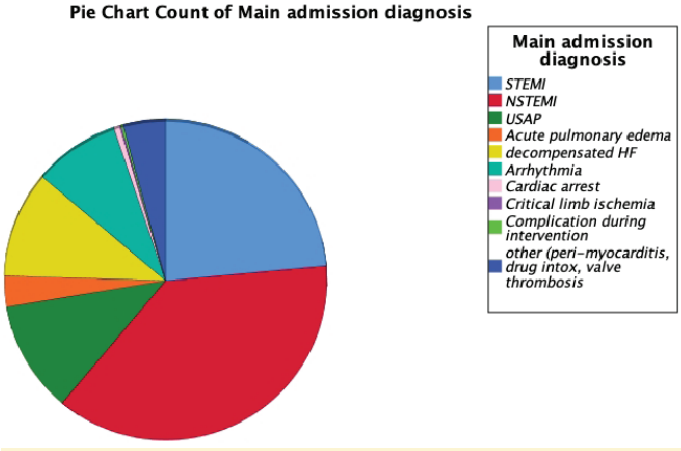

Figure 1. Distribution of diagnoses at admission. STEMI, ST-elevated myocardial infarction; NSTEMI, Non-ST elevated myocardial infarction.

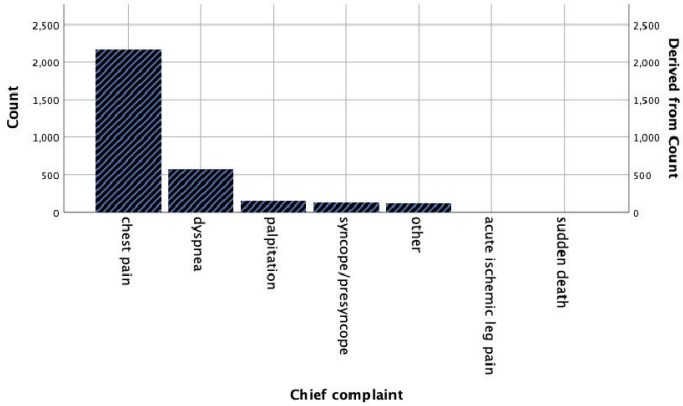

Figure 2. Distribution of main complaints.

Table 2. Demographic and Clinical Characteristics of Patients

	All Patients (n = 3157)	Acute Coronary Syndrome (n = 2284)	Other Diagnoses (n = 740)	*p*
Age (mean ± deviation)	64.3 ± 13	62.8 ± 12.2	69.8 ± 12.9	*<0.001*
Age (IQR)	65 (56-73)	63 (54-71)	71 (63-79)	*<0.001*
Male Gender, n (%)	2087 (66.1)	1612 (70.6)	401 (54.2)	*<0.001*
Hypertension, n (%)	1864 (59)	1264 (55.3)	526 (71.1)	*<0.001*
Diabetes Mellitus, n (%)	1184 (37.5)	835 (36.6)	310 (41.9)	*0.009*
Dyslipidemia, n (%)	1120 (35.5)	818 (35.8)	269 (36.3)	*0.791*
Smoking, n (%)				*<0.001*
Never	1202 (38.1)	738 (32.3)	392 (53)	
Ex-smoker	862 (27.3)	590 (25.8)	243 (32.8)	
Active smoker	1093 (34.6)	956 (41.9)	105 (14.2)	
Family History of CAD, n (%)	1101 (34.9)	835 (37.2)	230 (31.7)	*0.007*
CAD, n (%)	1446 (45.8)	1007 (44.1)	393 (53.1)	*<0.001*
PCI, n (%)	1090 (34.5)	775 (33.9)	288 (38.9)	*0.014*
MI, n (%)	974 (30.9)	684 (29.9)	271 (36.6)	*0.001*
CABG, n (%)	407 (12.9)	253 (11.1)	136 (18.4)	*<0.001*
PAD, n (%)				*<0.001*
No	2084 (66)	1560 (68.3)	427 (57.7)	
Yes	122 (3.9)	70 (3.1)	45 (6.1)	
Unknown	951 (30.1)	654 (28.6)	268 (36.2)	
AF, n (%)				*0.001*
No	2674 (84.7)	2160 (94.6)	410 (55.4)	
Paroxysmal	131 (4.1)	43 (1.9)	82 (11.1)	
Persistent	86 (2.7)	23 (1)	59 (8)	
Permanent	266 (8.4)	58 (2.5)	189 (25.5)	
Heart failure, n (%)				*0.001*
No	2179 (69)	1831 (80.2)	249 (33.6)	
Reduced EF HF	655 (20.7)	288 (12.6)	357 (48.2)	
Preserved EF HF	323 (10.2)	165 (7.2)	134 (18.1)	
Stroke History, n (%)				*0.001*
No	3015 (95.5)	686 (92.7)	2206 (96.6)	
Ischemic Stroke	125 (4)	67 (2.9)	49 (6.6)	
Hemorrhagic Stroke	17 (0.5)	11 (0.5)	5 (0.7)	
Prior Major Bleeding, n (%)	130 (4.1)	105 (4.7)	23 (3.2)	*0.082*
Chronic Renal Disease, n (%)				*0.001*
No	2723 (86.3)	2073 (90.8)	538 (72.7)	
Hemodialysis (-)	383 (12.1)	175 (7.7)	190 (25.7)	
Hemodialysis (+)	51 (1.6)	36 (1.6)	12 (1.6)	
Drug use on Admission				
Acetylsalicylic Acid, n (%)	1330 (42.1)			
Other Antiplatelets, n (%)	515 (16.3)			
Oral Anticoagulants, n (%)	418 (15.2)			
Beta Blockers, n (%)	1420 (45)			
ACE Inhibitors/ARB, n (%)	1419 (44.9)			
Calcium Channel Blockers, n (%)	488 (15.5)			
Statins, n (%)	930 (29.5)			
Proton Pump Inhibitors, n (%)	1377 (43.6)			

Continuous variables are presented as mean ± SD or median (IQR), categorical variables are presented as frequency (%).
ACE, angiotensinogen converting enzyme; bpm, beat per minute; BUN, blood urea nitrogen; CABG, coronary artery by-pass graft; CAD/PAD, Coronary Artery Disease/Peripheral Artery Disease; CRP, C-reactive protein; EF, ejection fraction; HF, heart failure; IQR, interquartile range; MI, myocardial infarction; SD, standard deviation; PCI, percutaneous coronary intervention; WBC, white blood cell.

Discussion

We aimed primarily to share data regarding the baseline clinical characteristics of the MORCOR-TURK study population consecutively admitted to CCUs in Türkiye with various cardiovascular emergencies. The MORCOR-TURK study included 50 CCU centers from various regions of Türkiye, representing a heterogeneous sample. The rationale, design, and methodology of the MORCOR-TURK trial were previously published.[9]

The first CCU registry in Türkiye was the Turkish Myocardial Infarction Registry (TUMAR) study, which enrolled 3,358 patients diagnosed with acute myocardial infarction (MI) within the first 24 hours of hospitalization. Similar to the TUMAR study, the Turkish Acute Coronary Syndrome (TURK-AKS) study (with 3,695 patients) and the Turkey Myocardial Infarction (TURKMI) study (with 1,930 patients) were designed to portray patient characteristics as well as diagnostic and practice patterns in ACS in Türkiye.[14,15] These trials focused on ACS patients, including those with STEMI, NSTEMI, and USAP diagnoses. Unlike the previous ones, our study included all types of CCU hospitalization causes.

Since their establishment in the 1960s, CCUs have improved mortality rates, achieving up to a 20% reduction secondary to myocardial infarction. Subsequently, CCUs gradually expanded to accommodate other cardiac emergency patients, along with mechanical expansions and dedicated staff. However, mortality in CCUs remains a complex matter influenced by various patient-related factors, disease severity, treatment approaches, and the quality of healthcare delivery. Although mortality rates in CCUs have improved over the years due to advancements in medical science, technology, and specialized care, it still remains a significant concern. Ongoing research and clinical studies aim to identify novel strategies to reduce mortality rates, enhance patient outcomes, and improve long-term prognosis further, continuing to be a priority in the field of cardiac care. Furthermore, the quality and efficiency of healthcare delivery in CCUs play a pivotal role in mortality outcomes. Adequate staffing, proper nurse-to-patient ratios, continuous monitoring, early recognition of deteriorating conditions, and prompt response to critical situations are vital components in achieving favorable outcomes. In addition, an interdisciplinary approach involving cardiologists, nurses, intensivists, and other healthcare professionals contributes to the comprehensive care and management of patients, which ultimately impacts mortality rates.[2,4,16]

Although the current study comprised all diagnoses admitted to the hospital, owing to the majority of the patients being acute coronary syndrome cases (72.3%), it is comparable with previous registries in Türkiye, as well as Western and Eastern countries. Furthermore, the most commonly encountered diagnosis in all patients and in the ACS group was NSTEMI, which was also predominant in previous studies. This high rate of NSTEMI may result from the fact that many patients admitted to the hospital are routinely tested for troponin levels, regardless of their chief complaint. Accordingly, diagnoses were often made based on laboratory findings, which makes it difficult to overlook the diagnosis. However, compared to previous Turkish registries, including TURKMI and TURK-AKS, the NSTEMI rate was even lower.[14,15] The TURKMI study also comprised a high rate of NSTEMI diagnosis (61.9%), similar to the American National Registry of Myocardial Infarction and the English Myocardial Ischemia National Audit Project registries.[6,8] One of the largest registries involving CCU patients was conducted by Doğan et al.[17] In this single-center and retrospective study, they aimed to provide a comprehensive evaluation of the patient profile, treatment, and outcomes of patients admitted to the CCU of a tertiary referral hospital. In that study, which is highly valuable as it includes 13,463 patients, the most common cause of hospitalization was also ACS, as in our study. However, the number of STEMI patients was higher than NSTEMI, which was the inverse in our study. The proportion of NSTEMI patients was slightly lower in the Saudi Arabian registry (34.1%), and the Japan Acute Myocardial Infarction Registry (23%) than in the TURKMI and the current registry.[18,19] Considering that our registry consisted of all patient groups, not only ACS patients, the NSTEMI diagnosis still remains the most prevalent.

Western registries indicate that the CCU patient population is older than the Eastern population. The mean age of the MORCOR-TURK population was 64.3 years, similar to the TURKMI and TURK-AKS registries, while the average age was younger in Saudi Arabian MI patients (56 years). Additionally, male predominance was highest in the Saudi population (85%) compared to our study and other registries (66.1%). The high rate of cardiovascular risk factors, including diabetes mellitus (52%) and smoking (51%), in the Saudi population may explain the higher rate of STEMI compared to NSTEMI.[18] Meanwhile, cardiovascular risk factors including hypertension, diabetes mellitus, smoking, and hyperlipidemia rates were found to be similar when compared to the TURKMI, TURK-AKS, United States, France, and England registries.[7,8,18,19] Interestingly, dyslipidemia rates did not vary significantly between the ACS and non-ACS groups in this study. While the smoking rate was statistically significantly higher in the ACS group, the rates of AH and DM were higher in the non-ACS group. A previous history of any type of CAD also contributed to hospitalizations secondary to non-ACS causes.

Heart failure diagnoses, including both preserved and decreased types, constituted 30.9% of all participants. However, the rate of decompensated heart failure was 10.7% (339 patients). Although it is not possible to determine which type was responsible for decompensation, we believe that most cases were due to reduced ejection fraction (EF), which was twice as common as preserved EF. Nevertheless, most patients with heart failure did not experience decompensation (1 out of 3 patients). On the other hand, heart failure was more common in the non-ACS group, as expected. Given the high rate of coronary artery disease history in the non-ACS group, ACS patients are expected to have a higher incidence of HF over time.

Although most heart rhythms were sinus patterns (84.7%), the most common pathological rhythm was AF. Furthermore, the AF rate was significantly higher in the non-ACS group. It can be speculated that ACS lays the groundwork for atrial fibrillation more in the long term than in the short term. Additionally, AF increases the risk of decompensation in non-ACS cardiac diseases.[13] Given that the heart failure rate was also higher in the non-ACS group,

a higher AF rhythm was expected. Chronic diseases precipitate the presence of AF, particularly permanent AF, which was the leading subtype.[20] On the other hand, although AF increases the risk for ACS development, it cannot be generalized that this risk is always elevated. Overall, AF rhythm should be closely monitored to prevent future adverse events. The AF rate reached its highest level in the Japanese registry at 6.9%, but this rate varied between 1.2-3.7% in other studies. A distinguishing characteristic of Japanese ACS patients was the common occurrence of hypertension, which we believe is the reason why the AF rate was so high in this registry. Other arrhythmic causes, including bradyarrhythmias and tachyarrhythmias, were rare causes of hospitalization. However, it should be noted that most deaths resulting from ACS and other cardiac diseases arise from arrhythmic causes.[13]

PAD was found to be rare as a cause of CCU admission. However, PAD is expected to be higher in prevalence alongside ACS.[21] It can be suggested that patients may be screened for PAD presence, even if they have no chief complaints related to it. On the other hand, chronic kidney disease seems to deteriorate patients' clinical conditions, thereby increasing the rate of hospitalization, especially in those who do not require hemodialysis.

Study Limitation

Firstly, the inclusion criteria were not strictly linked to acute coronary syndrome, thereby, some diagnoses might have been missed or misinterpreted by other disciplines such as pulmonology, internal medicine, or cardiovascular surgery. Secondly, there might be slight differences in diagnostic criteria or hospitalization restrictions between centers. Additionally, although most ACS patients are referred to PCI centers, our selection of centers was not based on their capability to perform PCI, which may affect the results.

Conclusion

The nationwide MORCOR-TURK trial defined the characteristics of patients hospitalized in CCUs across different parts of Türkiye. The demographic features of the population were similar to those in other Turkish and Western studies. The most common cause of admission was ACS, and hypertension (HT) was the main risk factor in the study population. Chest pain was the most common reason for admission, while the most common pathological rhythm was AF.

Ethics Committee Approval: The study was approved by the Afyonkarahisar University of Health Sciences Clinical Research Ethics Committee (Approval Number: 2011-KAEK-2, Date: 05.08.2022).

Informed Consent: Written informed consent was obtained from all participants or their relatives.

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