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Short-Term Prognosis of Elderly Patients Admitted to the Coronary Care Unit: A Subgroup Analysis of the MORCOR-TURK (Mortality and Morbidity in Coronary Care Units in Türkiye) Trial

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ABSTRACT

Objective: This subgroup analysis of the MORCOR-TURK (Mortality and Morbidity in Coronary Care Units in Türkiye) trial aimed to determine the short-term prognosis, mortality rates, and predictors for elderly patients followed in coronary care units (CCUs) in Türkiye.

Methods: The MORCOR-TURK trial is a national, non-interventional, multicenter observational study conducted in Türkiye (ClinicalTrials.gov number NCT05296694). The study population includes CCU patients from 50 centers selected from all regions of Türkiye (between September 1 and 30, 2022 prospectively). In the subgroup analysis, patients were divided into two groups: Group 1 (ages 65 to < 75 years, *n* = 923 patients) and Group 2 (ages ≥ 75 years, *n* = 713 patients). At the end of the analysis, short-term prognosis, mortality rates, and predictors were documented.

Results: The mean age of Group 1 was 69 (67-72) years, and Group 2 was 80 (77-84) years. Chest pain was the most common reason for admission (968 patients [59.16%]), and acute coronary syndrome was the most common reason for hospitalization in the CCU (1,053 patients [64%]). Atrial fibrillation (AF) was the most common arrhythmia (356 patients [21.76%]). The mortality rate was 6.11% in elderly patients (4.23% in Group 1 and 8.56% in Group 2). The multivariate regression analysis showed that age (*P* = 0.046, *P* = 0.003), chronic kidney disease (*P* = 0.011, *P* = 0.045), and ventricular tachycardia/ventricular fibrillation (VT/VF) during hospitalization (*P* < 0.001) were the main factors that increased mortality in both groups. Other independent mortality risk factors were smoking for Group 1 and aortic stenosis for Group 2.

Conclusion: This study represents the most comprehensive assessment of the short-term prognosis for elderly patients admitted to CCUs in Türkiye. It showed that coronary artery disease was the most common reason for admission and age over 75 and chronic kidney disease were the main determinants of mortality.

Keywords: Coronary care unit, elderly, mortality, prognosis, short term, Türkiye

ÖZET

Amaç: MORCOR-TURK çalışmasının alt grup analizinde, Türkiye'deki koroner bakım ünitelerinde (KBÜ) izlenen yaşlı hastaların kısa dönem prognozu, mortalite oranları ve öngördürücülerinin belirlenmesi amaçlandı.

Yöntem: MORCOR-TURK çalışması, Türkiye'de yürütülen ulusal, girişimsel olmayan, çok merkezli ve gözlemsel bir çalışmadır (ClinicalTrials.gov no NCT05296694). Araştırmanın evrenini Türkiye'nin tüm bölgelerinden seçilen 50 merkezdeki (prospektif olarak 1-30 Eylül 2022 tarihleri arasında izlenmiş KBÜ hastaları oluşturmaktadır. Araştırmanın alt grup analizinde hastalar grup 1 (65 yaş <75 yaş, *n* = 923 hasta) ve grup 2 (≥ 75 yaş, *n* = 713 hasta) olmak üzere 2 gruba ayrılmıştır. Analizin sonunda kısa vadeli prognoz, mortalite oranları ve öngörücüler belgelenmiştir.

Bulgular: Grup 1'in ortalama yaşı 69 (67-72), grup 2'nin yaş ortalaması 80 (77-84) idi. Göğüs ağrısı en sık başvuru nedeniydi (968 hasta [%59,16]) ve akut koroner sendrom KBÜ'ye yatışların en sık nedeniydi (1053 hasta [%64]). Atriyal fibrilasyon (AF) en sık görülen aritmiydi [356 hasta (%21,76)]. Yaşlı hastalarda mortalite oranı %6,11 idi (grup 1'de %4,23 ve grup 2'de %8,56). Çok değişkenli regresyon analizi, yaş (*P* = 0,046, *P* = 0,003), kronik böbrek hastalığı (*P* = 0,011, *P* = 0,045) ve hastanede yatış sırasındaki VT/VF'nin (*P* < 0,001) her iki grupta da ölüm oranını artıran ana faktörler olduğunu gösterdi. Diğer bağımsız mortalite risk faktörleri Grup 1 için sigara, Grup 2 için aort stenozu idi.

Sonuç: Bu çalışma, Türkiye'de KBÜ'lere kabul edilen yaşlı hastalarda kısa dönem prognozu değerlendiren en kapsamlı araştırmadır. Bulguları, koroner arter hastalığının en yaygın başvuru nedeni olduğunu ve 75 yaş üstü olma ile kronik böbrek hastalığının mortalitenin ana belirleyicileri olduğunu göstermiştir.

Anahtar Kelimeler: Koroner yoğun bakım ünitesi, yaşlı, mortalite, prognoz, kısa dönem, Türkiye

ORIGINAL ARTICLE
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The coronary care unit (CCU) is commonly used for the follow-up and treatment of patients with acute myocardial infarction (MI), cardiovascular (CV) emergencies such as acute heart failure (HF), life-threatening arrhythmias, and hemodynamically unstable cardiac diseases.[1-3] For this purpose, CCUs hold an important place in health systems. Furthermore, CCUs function as well-equipped centers with continuous monitoring systems, clinical care services, and programs of advanced treatment methods.[4]

It is widely accepted that aging is a natural process that increases mortality rates in individuals aged 65 and over.[5] Many physiopathological changes occur in the body and CV system with aging (such as a decrease in total body fluid and metabolic rate, decrease in cardiac output and stroke volume, hypertension, coronary artery diseases, valve calcifications, arrhythmias etc.).[6] Therefore, treatment approaches and drug dosages should be planned individually for elderly patients in CCU follow-up. It is important to consider socioeconomic, cultural, demographic, and religious differences between countries during the planning process. For this purpose, it is rational for each country to evaluate its own data and determine its own diagnosis, follow-up, and treatment approaches. Mortality rates in CCUs vary between countries (ranging from 5% to 13%).[1-3] These differences may be attributed to various factors such as demographic characteristics, diagnosis and treatment tools, and the socioeconomic level of the countries.

To date, there has been limited data on the short-term prognosis of elderly patients in CCUs in Türkiye, with only single-center studies identified. Moreover, these studies were designed retrospectively.[7,8] Currently, there is no national multicenter prospective study examining mortality rates and predictors in the literature.

An Investigation of the Short-Term Prognosis of Elderly Patients Admitted to CCU: A Subgroup analysis of the MORCOR-TURK (Mortality and Morbidity in Coronary Care Units in Türkiye) study[9] was conducted to provide current data on elderly rates and short-term prognosis in patients admitted to CCUs in Türkiye.

ABBREVIATIONS

ACS	Acute coronary syndrome
AF	Atrial fibrillation
AR	Aortic regurgitation
AS	Aortic stenosis
CCU	Coronary care unit
CKD	Chronic kidney disease
CRP	C-reactive protein
CV	Cardiovascular
DM	Diabetes mellitus
EF	Ejection fraction
eGFR	Estimated glomerular filtration rate
Hb	Hemoglobin
HT	Hypertension
MI	Myocardial infarction
MORCOR-TURK	Mortality and Morbidity in Coronary Care Units in Türkiye
MR	Mitral regurgitation
ROC	Receiver operating characteristic
TR	Tricuspid regurgitation
VF	Ventricular fibrillation
VT	Ventricular tachycardia
WBC	White blood cells

Materials and Methods

Study Design

The MORCOR-TURK study (clinicaltrials.gov NCT05296694) is a multicenter, prospective, cross-sectional, and non-interventional study. The study protocol was reviewed and approved by the Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (Approval Number: 2022/9-422; Date: 05/08/2022).[9] All participants or their relatives provided written informed consent. Subgroup analysis was performed using this data to evaluate patients aged 65 and over. The study primarily evaluated demographic data and short-term prognosis (as predictors of CV events and in-hospital mortality). The study compared Group 1, consisting of patients aged 65-74 years (young old), with Group 2, consisting of patients aged 75 years and older (old/very old). The CCU follow-up time refers to the duration of stay in the CCU, measured in hours, as a short-term follow-up term.

Study Population

The study included all consecutive patients aged 65 years and older with various cardiac emergencies who were admitted to the CCUs of participating centers between September 1-30, 2022 and had signed an informed consent form. The patients were divided into two groups: Group 1 (n = 923 patients) and Group 2 (n = 713 patients). The study excluded patients who were under 65 years of age and applied the exclusion criteria of the MORCOR TURK study.[9]

Statistical Analysis

The normal distribution was assessed using the Shapiro-Wilk test. As it was found to be non-normal, the Mann-Whitney U test (for two groups) was used for evaluation. Quartiles were used to analyze the data and are explained below the tables. Qualitative variables were evaluated with the Pearson chi-square test.

The risk factors for mortality in elderly patients in CCUs were determined using univariate and multivariate binary logistic regression analysis. For quantitative variables with normal distribution, mean and standard deviation were used, while median and quartiles were used for those without. Qualitative variables were presented as frequency and percentage. Optimum cut-off levels of estimated glomerular filtration rate (eGFR) for the prediction of mortality were performed with receiver operating characteristic (ROC) curve analysis. A significance level of 0.05 was used for all statistical evaluations, and SPSS (Version 29.0.1.0) statistical software was used for all analyses (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp. SPSS Inc., Chicago, United States).

No artificial intelligence (AI)-enabled technologies (such as Large Language Models [LLM], chatbots, or image generators) were used in the production of our article.

Results

The baseline demographic features of participants are demonstrated in Table 1. As anticipated, the incidences of traditional risk factors such as age, HF, and chronic kidney

Table 1. Baseline Demographic Parameters of the Study Population in Comparison with Age Group and Death

	Group 1 (n = 923)			Group 2 (n = 713)		
Variables	**Deceased (n = 39)**	**Survived (n = 884)**	***P***	**Deceased (n = 61)**	**Survived (n = 652)**	***P***
Age (years)	71 (69-73)	69 (67-72)	**0.013**	84 (77.5-88)	80 (77-84)	**0.003**
Gender			0.672			0.135
Female	13 (33.33)	324 (36.66)		38 (62.29)	341 (52.3)	
Male	26 (66.67)	560 (63.34)		23 (37.7)	311 (47.69)	
HT	27 (69.23)	611 (69.11)	0.988	50 (81.96)	493 (75.61)	0.265
DM	23 (58.97)	413 (46.71)	0.134	19 (31.14)	250 (38.34)	0.268
CHADSVASC Score	4 (3-4)	3 (2-4)	0.127	4 (4-6)	4 (4-5)	**0.038**
Smoking			**0.011**			0.350
Never	10 (25.64)	359 (39.97)		37 (60.65)	401 (61.50)	
Ex-smoker	22 (56.41)	284 (32.12)		16 (26.22)	199 (30.52)	
Active	7 (17.94)	241 (40.61)		8 (13.11)	52 (7.97)	
HF			**0.005**			**<0.001**
No	16 (41.02)	584 (66.07)		20 (32.78)	341 (52.3)	
rHF	18 (46.15)	208 (23.53)		34 (55.73)	189 (28.98)	
pHF	5 (12.82)	92 (10.40)		7 (11.47)	122 (18.71)	
Dyslipidemia	18 (46.15)	338 (38.23)	0.318	16 (26.22)	246 (37.73)	0.075
CAD	23 (58.97)	461 (52.14)	0.402	35 (57.37)	351 (53.83)	0.595
MI History	17 (43.58)	309 (34.95)	0.351	28 (45.9)	231 (35.42)	0.104
PCI History	13 (33.33)	353 (39.93)	0.405	26 (42.62)	250 (38.34)	0.512
CABG History	11 (28.20)	140 (15.83)	**0.041**	10 (16.39)	110 (16.87)	0.924
Stroke (no)	36 (92.30)	829 (93.77)	0.779	56 (91.80)	604 (92.63)	0.313
AF			0.165			0.516
No	29 (74.36)	739 (83.59)		40 (65.57)	446 (68.40)	
Paroxysmal	3 (7.69)	35 (3.95)		5 (8.19)	48 (7.36)	
Persistent	3 (7.69)	23 (2.60)		5 (8.19)	27 (4.14)	
Permanent	4 (10.26)	87 (9.84)		11 (18.03)	131 (20.09)	
Prior Bleeding	1 (2.56)	35 (4.04)	0.644	1 (1.75)	28 (4.39)	0.340
CKD			**<0.001**			**0.017**
No	21 (53.84)	735 (83.14)		39 (63.93)	491 (75.3)	
Yes (HD-)	16 (41.02)	133 (15.04)		19 (31.14)	154 (23.61)	
Yes (HD+)	2 (5.12)	16 (1.81)		3 (4.91)	7 (1.07)	

AF, Atrial Fibrillation; CABG, Coronary Artery Bypass Graft; CAD, Coronary Artery Disease; CKD, Chronic Kidney Disease; DM, Diabetes Mellitus; HD, Hemodialysis; HF, Heart Failure; HT, Hypertension; MI, Myocardial Infarction; PCI, Primary Coronary Intervention; n, Patient number. Descriptives summarized as median (IQR) or n (%), interquartile range [25% percentile-75% percentile]. Group 1 is defined as young-old, aged between 65-74 years old. Group 2 is defined as old-very old, aged 75 years or older.

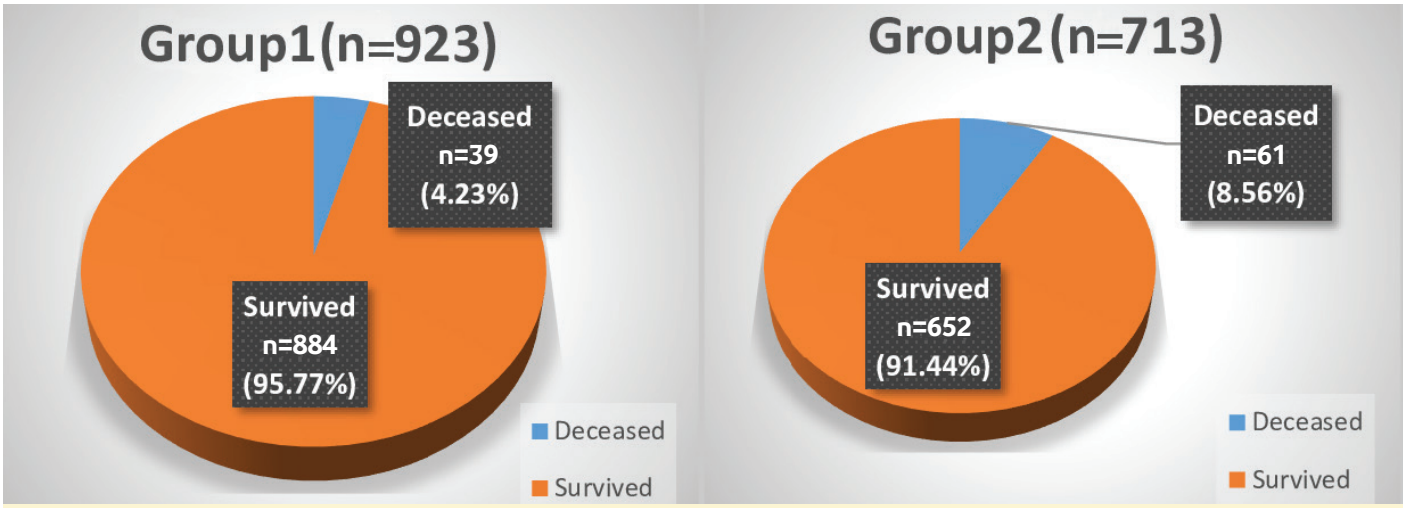

Figure 1. Mortality rates among elderly patients in the MORCOR-TURK (Mortality and Morbidity in Coronary Care Units in Türkiye) study.

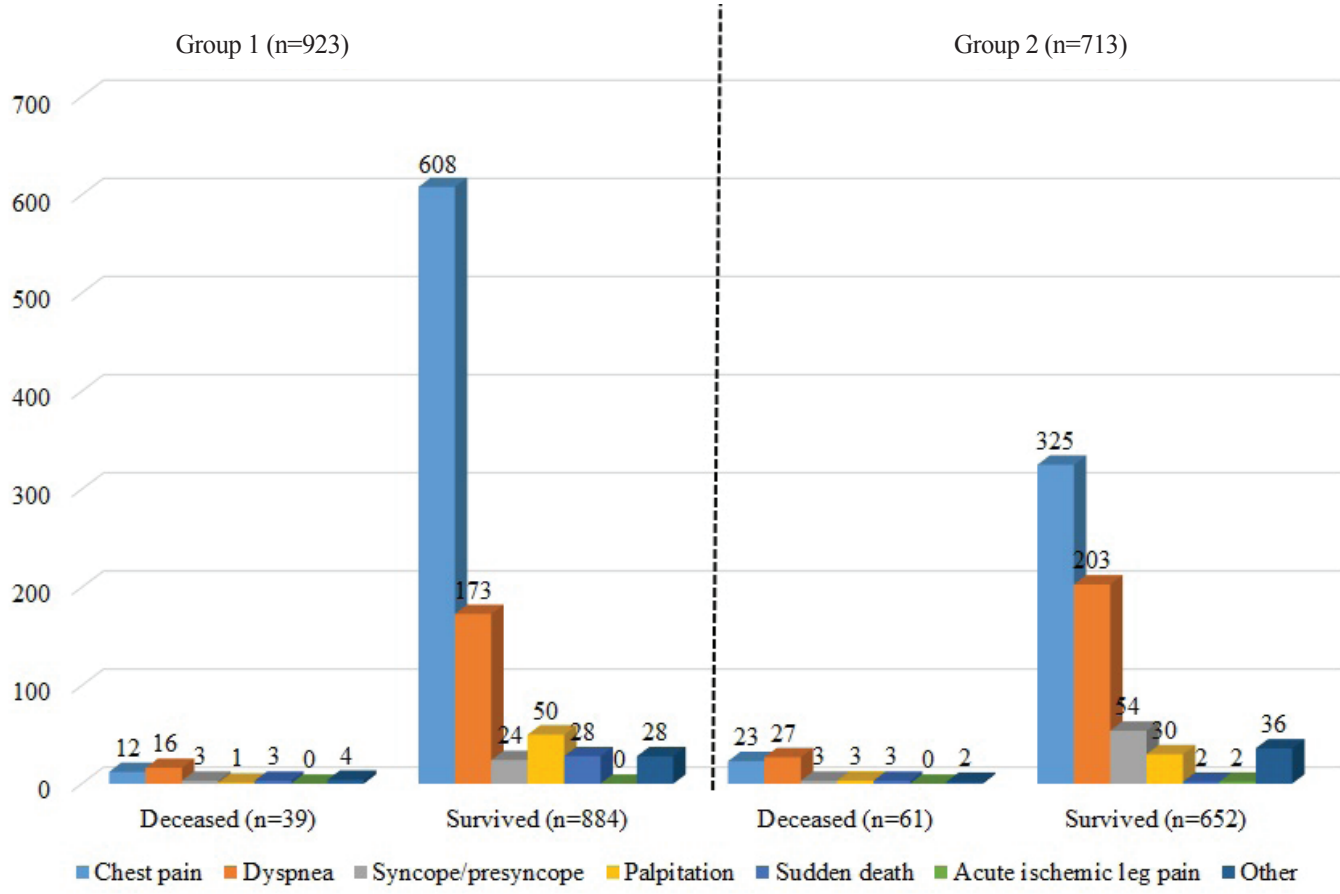

Figure 2. Chief complaints of the study population.

disease (CKD), differed significantly between the two groups. Additionally, the CHADSVASC score (the risk of stroke in atrial fibrillation [AF]) was significantly higher in Group 2, while smoking was more prevalent in Group 1 (Table 1). Figure 2 shows that chest pain and dyspnea were the most common complaints leading to CCU admission, followed by palpitations and syncope.

Figure 3 demonstrates the diagnoses and frequencies of the study population upon admission to the hospital. Group 2 had higher occurrences of AF, atrioventricular block, and ventricular arrhythmias. Although the ejection fraction (EF) was similar between groups, patients in the decreased groups had lower EF. Aortic stenosis (AS) and aortic regurgitation (AR) were more common in Group 2, while mitral regurgitation and tricuspid regurgitation (MR and TR) were more common in Group 1. In patients who passed away, both groups had higher rates of MR and AR, while AS and TR were more prevalent in Group 2 (Table 2).

Figure 1 shows the mortality rates of elderly patients in CCUs. In-hospital mortality was higher in Group 2, and ventricular arrhythmias were a basic factor in both groups. Although CCU hospitalization time was longer for those who died, it was not statistically significant (Table 3).

In ROC curve analysis, the area under the curve of the eGFR for predicting mortality was 0.77 (95% confidence interval [CI]: 0.74-0.80; $P < 0.001$); sensitivity, 88%; specificity, 59%, and the optimum cut-off value was 62 ml/min. in Group 1 and 0.60 (95% CI: 0.56-0.64; $P < 0.006$); sensitivity, 57%; specificity, 65%, and the optimum cut-off value was 41 ml/min. in Group 2 (Figure 4).

The clinical factors contributing to mortality in elderly patients were evaluated using uni- and multivariate regression analysis. Both age and ventricular tachycardia/ ventricular fibrillation (VT/VF) during hospitalization, as well as chronic kidney disease (CKD), were identified as independent risk factors for mortality in both groups. Furthermore, smoking was identified as an independent risk factor for mortality in Group 1, while AS was identified as an independent risk factor for mortality in Group 2 (Tables 4 and 5).

Discussion

In the subgroup analysis of elderly patients in the MORCOR-TURK study, 6.11% of the total mortality (4.23% in Group 1 and 8.56% in Group 2) occurred in CCUs in Türkiye (Figure 1). Independent predictors of mortality included VT/VF during hospitalization, age, AS, smoking, and CKD. Group 2 consisted of older patients, with a higher percentage of females compared to Group 1. Consequently, the CHADSVASC score was higher in Group 2.

The study's other main findings were as follows: (1) The demographic analysis revealed that hypertension (HT), diabetes mellitus (DM), AF, and CKD were more frequent in the advanced

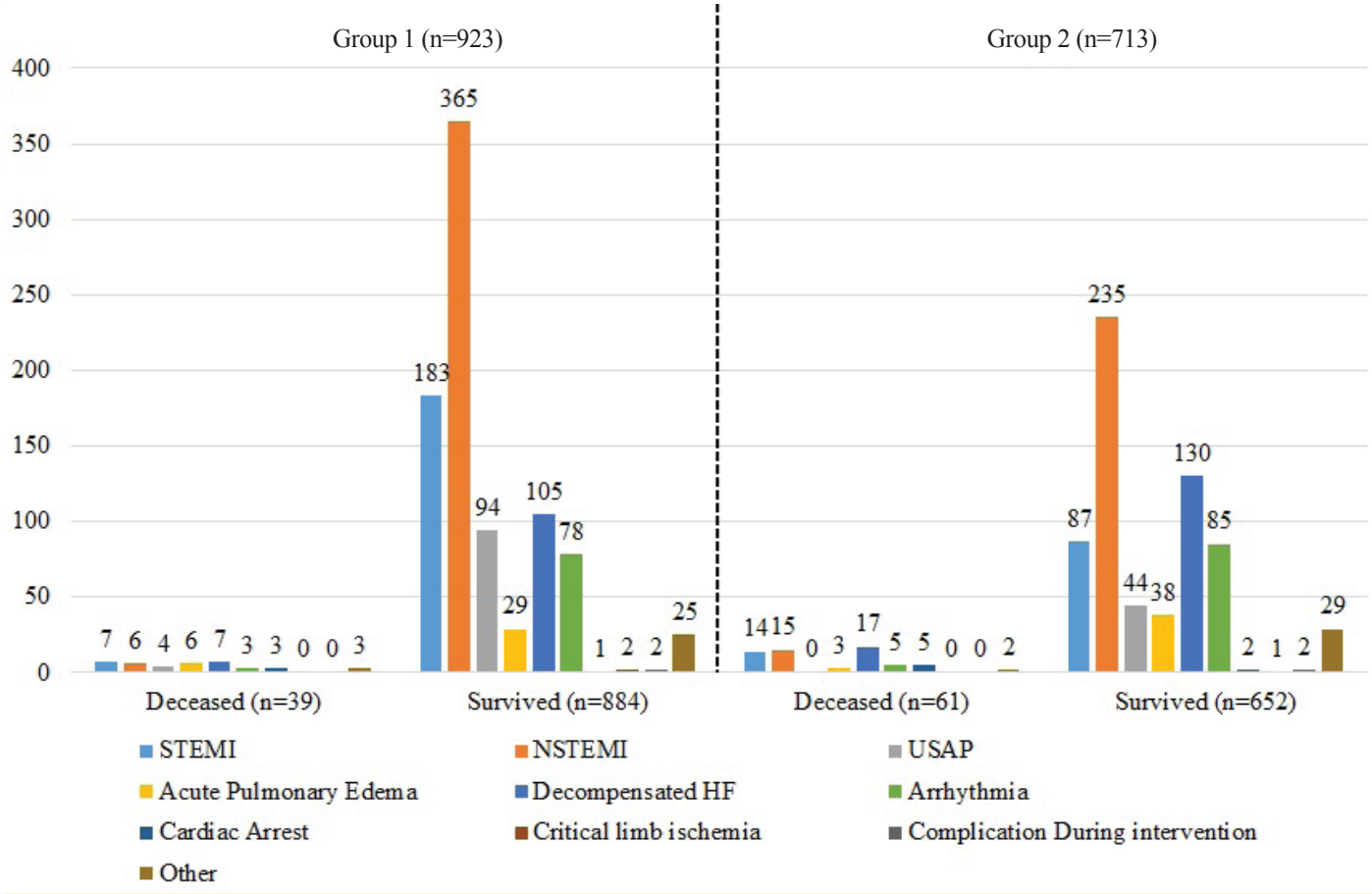

Figure 3. Diagnoses of the study population on admission to the hospital.

Table 2. Echocardiography Parameters of the Study Population

	Group 1 (n = 923)			Group 2 (n = 713)		
Variables	**Deceased (n = 39)**	**Survived (n = 884)**	***P***	**Deceased (n = 61)**	**Survived (n = 652)**	***P***
Ejection Fraction	33 (30-50)	50 (40-55)	**<0.001**	40 (30-50)	50 (40-55)	**<0.001**
Mitral Regurgitation			**0.029**			**<0.001**
No	8 (24.24)	240 (30.96)		4 (7.01)	145 (24.32)	
Mild/Moderate	20 (60.6)	498 (64.25)		46 (80.7)	413 (69.29)	
Severe	5 (15.15)	37 (4.77)		7 (12.28)	38 (6.37)	
Mitral Stenosis			0.900			0.953
No	31 (93.93)	726 (95.02)		51 (94.44)	555 (94.06)	
Mild/Moderate	2 (6.06)	36 (4.71)		3 (5.55)	34 (5.76)	
Severe	0 (0)	2 (0.26)		0 (0)	1 (0.16)	
Aortic Regurgitation			**0.049**			**0.017**
No	21 (61.76)	604 (78.74)		26 (47.27)	386 (65.64)	
Mild/Moderate	12 (35.29)	156 (20.33)		28 (50.9)	199 (33.84)	
Severe	1 (2.94)	7 (0.91)		1 (1.81)	3 (0.51)	
Aortic Stenosis						**0.009**
No	30 (90.9)	727 (95.88)	0.211	40 (76.92)	525 (90.36)	
Mild/Moderate	3 (9.09)	26 (3.42)		9 (17.3)	38 (6.54)	
Severe	0 (0)	6 (0.79)		3 (5.76)	18 (3.09)	
Tricuspid Regurgitation			0.064			**0.014**
No	9 (26.47)	325 (42.26)		12 (21.81)	170 (28.91)	
Mild/Moderate	21 (61.76)	407 (52.92)		30 (54.54)	356 (60.54)	
Severe	4 (11.76)	37 (4.81)		13 (23.63)	62 (10.54)	

n, patient number. Descriptives summarized as median (IQR) or n (%), interquartile range [25% percentile-75% percentile]. Ejection fraction is defined as %. Group 1 is defined as young-old, aged between 65-74 years old. Group 2 is defined as old-very old, aged 75 years or older.

Table 3. In-Hospital Prognosis and Events of the Study Population

Variables	Group 1 (n = 923)			Group 2 (n = 713)		
	Deceased (n = 39)	Survived (n = 884)	*P*	Deceased (n = 61)	Survived (n = 652)	*P*
CCU- Follow-up Time	72 (9-198)	48 (24-67)	0.173	64 (23-146)	48 (24-72)	0.355
Atrial Fibrillation						
No	27 (69.23)	701 (79.3)	0.321	36 (59.02)	438 (67.18)	
Yes	4 (10.26)	62 (7.01)		7 (11.48)	54 (8.28)	0.412
Not Applicable	8 (20.52)	121 (13.69)		18 (29.50)	160 (24.54)	
Ventricular Fibrillation/Tachycardia			**<0.001**			
No						
Mild/Moderate	20 (51.28)	853 (96.82)		40 (65.57)	625 (95.85)	**<0.001**
Severe	3 (7.69)	13 (1.48)		0 (0)	8 (1.22)	
	16 (41.02)	15 (1.70)		21 (34.43)	19 (2.93)	
Bleeding			**0.03**			
No	36 (92.31)	863 (97.62)		54 (88.52)	628 (96.32)	
Minor	2 (5.13)	20 (2.27)		3 (4.92)	16 (2.45)	**0.009**
Major	1 (2.56)	1 (0.11)		4 (6.56)	8 (1.23)	

CCU, Coronary Care Unit; n, patient number. Descriptives summarized as median (IQR) or n (%), interquartile range [25% percentile-75% percentile]. Follow-up time is defined as hours. Group 1 is defined as young-old, aged between 65-74 years old. Group 2 is defined as old-very old, aged 75 years or older.

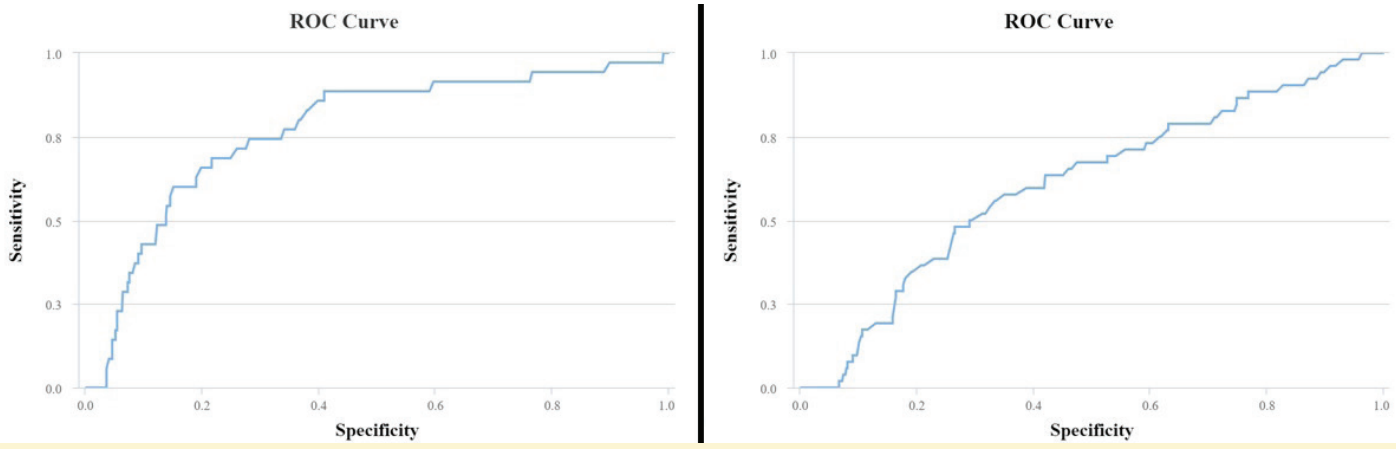

Figure 4. Receiver operating characteristic (ROC) curve analysis of estimated glomerular filtration rate (eGFR) in groups.

age group (Group 2); (2) Chest pain was the primary reason for admission in both groups; (3) Although the mean EF was similar in both groups, the mean EF was significantly lower in patients who died; (4) The in-hospital bleeding rate and need for hemodialysis were higher in the group of patients who died; and (5) Biochemical parameters showed that eGFR and hemoglobin values were lower, and CRP values were higher in Group 2 patients who died (Supplement 1).

The subgroup analysis of this multicenter study was planned due to the absence of large-scale data on the short-term prognosis of elderly patients in CCUs in Türkiye, and the high risk of mortality/morbidity in this population. The aim is to provide insight into the development of new treatment approaches and our health system by using the data from Türkiye.

As in previous studies, acute coronary syndrome (ACS) (46%) was identified as the leading cause of death among elderly patients in CCUs in Türkiye.[7,8,10] It is important to evaluate ACS in these patients, taking into account all causes of mortality, despite reports that collateral circulation that develops in advanced ages reduces the impact of ACS. The absence of mortality resulting from complications during the interventional treatment of elderly patients suggests that operators in Türkiye possess a high level of experience and/or that patient selection is of a high standard (Figure 3). The TEKHARF (The Turkish Adult Risk Factor) study[10] found that the mean age of ACS patients was 68 years. We evaluated the short-term prognosis of elderly patients, a subgroup of the MORCOR-TURK study.[9,11]

Dogan et al.[7] reported a 12-year mortality rate of 12.7% in a tertiary CCU in Türkiye based on a retrospective review. Our study found a lower rate of 6.11% in elderly patients with a high risk of mortality. In their study, Bruoha et al.[12] found that the CCU mortality rate in older patients was 5.6%, which is similar to our

Table 4. Univariate and Multivariate Binary Logistic Regression Analysis of the Mortality for Group 1

LogReg	Univariate Model			Multivariate Model		
Variables	**OR**	**95% CI**	***P***	**OR**	**95% CI**	***P***
Age	1.15	1.02-1.30	**0.015**	1.19	1.00-1.41	**0.046**
HF						
Reduced	0.50	0.18-1.40	0.192	0.49	0.13-1.75	0.275
Preserved	1.59	0.57-4.41	0.372	0.99	0.19-5.21	0.995
Smoking						
Ex Smoker	0.95	0.36-2.55	0.930	1.62	0.40-6.49	0.492
Active Smoker	2.66	1.12-6.35	**0.027**	3.11	1.05-9.14	**0.039**
CABG	0.47	0.23-0.98	**0.045**	1.27	0.39-4.08	0.681
CKD						
HD (-)	0.22	0.49-1.05	0.05	3.60	1.34-9.65	**0.011**
HD(+)	0.96	0.20-4.57	0.96	5.63	0.57-55.3	0.138
LVEF	0.94	0.91-0.96	**<0.001**	0.91	0.87-0.96	**<0.001**
MR						
Mild/Moderate	0.24	0.07-0.79	**0.01**	0.30	0.09-1.03	0.056
Severe	0.29	0.10-0.83	**0.02**	1.25	0.24-6.39	0.788
AR						
Mild/Moderate	0.24	0.02-2.06	0.196	1.22	0.41-3.58	0.713
Severe	0.53	0.06-4.74	0.577	2.75	0.16-45.36	0.479
VT/VF in Hospital						
NSVT	0.02	0.01-0.05	**<0.001**	3.77	0.58-24.21	0.161
VT/VF	0.21	0.05-0.91	**0.037**	109.59	30.70-391.23	**<0.001**
Bleeding						
Minor	0.04	0.003-0.68	**0.026**	1.33	0.13-13.5	0.807
Major	0.10	0.04-2.28	0.149	0	0	0.991

AS, Aortic Stenosis; CKD, Chronic Kidney Disease; EF, Left Ventricular Ejection Fraction; GFR, Glomerular Filtration Rate; HD, Hemodialysis, HF, Heart Failure; MR, Mitral Regurgitation; NSVT, Non-Sustained Ventricular Tachycardia; VF, Ventricular Fibrillation; VT, Sustained Ventricular Tachycardia. Group 1 is defined as young-old, aged between 65-74 years old.

study. Our well-trained interventional cardiologists and global health system have demonstrated high success rates in invasive treatments and CCU.

In HF, which is one of the independent risk factors for mortality in elderly patients, both preserved and reduced EF HF rates were found to increase with age (Table 1). Patients with HF, which we have identified as the second most common cause of death (Figure 3), may require closer follow-up and longer hospitalization. Each treatment option should be evaluated objectively and comprehensively. The inclusion of the Heart Team in the decision-making process is recommended to increase the success of the treatment.

The most common symptom on admission to the hospital was chest pain, which is consistent with the literature.[7,8,10] However, in elderly patients who died, dyspnea was the most common presenting symptom (Figure 2). Regarding dyspnea in elderly patients in CCU, a thorough physical examination and further evaluation are recommended. Dyspnea can be a common symptom of ACS, HF, and cardiac arrhythmias, so it is important to quickly determine the cause and initiate appropriate treatment.

In the echocardiographic examinations of the patients, the rates of severe valve disease were higher in Group 2, as expected. We also found a statistically significant increase in the rates of severe valve diseases (AS, AR, MR, TR) in patients who died (Table 2). However, only AS was identified as an independent predictor of mortality in Group 2 in the multivariate analysis ($P < 0.031$). This finding suggests that the combination of primary anatomic pathology (outflow tract obstruction) and age in AS has a synergistic effect on mortality.

When in-hospital events and short-term prognosis were examined, it was found that mortality rates increased with age, reaching 4.23% in Group 1 and 8.56% in Group 2 (6.11% overall) (Figure 1). Additionally, it was determined that the patients who died had longer hospitalizations with advanced intensive care support, which is consistent with the literatüre.[8] Furthermore, the univariate analysis revealed statistically significant increases in age, in-hospital bleeding, the development of VT/VF, HF, mild/moderate MR, AS, and chronic kidney disease in patients who died. However, the multivariate analysis identified only age, VT/VF during hospitalization, and chronic kidney disease as independent predictors in both groups (Tables 4 and 5). Based on our results, it is recommended that close attention is paid to the elderly who may have difficulty tolerating VT/VF and acute renal failure. Individualized treatment plans should be implemented promptly upon hospitalization.

The biochemical examination showed that patients who died had lower levels of estimated glomerular filtration rate, hemoglobin (Hb), albumin, and calcium. Furthermore, the levels of fasting

Table 5. Univariate and Multivariate Binary Logistic Regression Analysis of the Mortality for Group 2

LogReg	Univariate Model			Multivariate Model		
Variables	**OR**	**95% CI**	***P***	**OR**	**95% CI**	***P***
Age	1.089	1.03-1.11	**<0.001**	1.11	1.03-1.19	**0.003**
HF						
Reduced	1.02	0.42-2.47	0.961	1.37	0.50-3.72	0.536
Preserved	3.13	1.34-7.29	**0.008**	0.64	0.19-2.09	0.460
CHADSVASC Score	1.25	1.02-1.54	**0.032**	1.04	0.76-1.43	0.779
CKD						
HD (-)	0.18	0.04-0.74	**0.018**	1.31	0.57-2.96	0.518
HD (+)	0.28	0.06-1.20	0.089	6.16	1.04-36.42	**0.045**
LVEF	0.95	0.93-0.97	**<0.001**	0.96	0.93-1.00	0.089
MR						
Mild/Moderate	0.15	0.04-0.53	**0.004**	2.74	0.76-9.78	0.120
Severe	0.60	0.25-1.43	0.251	1.68	0.23-12.12	0.604
AR						
Mild/Moderate	0.20	0.20-2.01	0.173	1.79	0.82-3.90	0.138
Severe	0.42	0.04-4.20	0.462	0	0	0.994
AS						
Mild/Moderate	0.45	0.12-1.61	0.225	2.94	1.10-7.85	**0.031**
Severe	1.42	0.34-5.89	0.628	1.29	0.18-9.05	0.795
TR						
Mild/Moderate	0.33	0.14-0.77	**0.011**	0.49	0.19-1.23	0.132
Severe	0.40	0.19-0.81	**0.011**	1.39	0.41-4.66	0.595
VT/VF in Hospital						
NSVT	0.05	0.02-0.15	0.999	0	0	0.988
VT/VF	0.04	0.00-0.00	**0.011**	33.75	12.53-90.88	**<0.001**
Bleeding						
Minor	0.17	0.05-0.59	**0.005**	1.45	0.20-11.84	0.675
Major	0.37	0.06-2.09	0.264	4.93	0.80-30.40	0.085

AR, Aortic Regurgitation; AS, Aortic Stenosis; CKD, Chronic Kidney Disease; EF, Left Ventricular Ejection Fraction; HD, Hemodialysis; HF, Heart Failure; MR, Mitral Regurgitation; NSVT, Non-Sustained Ventricular Tachycardia; TR, Tricuspid Regurgitation; VF, Ventricular Fibrillation; VT, Sustained Ventricular Tachycardia. Group 2 is defined as old-very old, aged 75 years or older.

blood sugar, creatinine, white blood cells (WBC), C-reactive protein (CRP), and potassium were significantly higher (Supplement 1). These results show that early initiation of infection treatment, along with renal hydration and electrolyte treatments in CCUs, may provide clinical benefits for the elderly and is an important aspect of the supportive treatment for anemia.[13]

Our study found that the presence of AF before or during CCU hospitalization (independent of type) did not have a significant impact on mortality in the elderly. However, acute AF may contribute to mortality by causing hemodynamic instability in critically ill patients in the ICU. Therefore, we recommend that rhythm control strategies be considered as the first line of treatment for AF in elderly patients followed in ICUs, after a detailed evaluation by the Heart Team. The literature shows that AF is a poor prognostic factor, particularly in frail elderly patients.[14]

Additionally, it is noteworthy that women are more common in CCU admissions in Group 2, which differs from the general characteristics of the MORCOR-TURK study.[11] This may be due to the longer life expectancy of women in Türkiye[10] or their higher awareness at an older age.

Finally, it is well-established that the inclusion of CCUs in emergency cardiac events reduces mortality rates among elderly patients.[15] We believe that further development of CCUs with advanced treatment methods and special nursing care will yield even more positive results for patients and Türkiye's healthcare system.

Study Limitations

This study has several limitations. Firstly, it does not include all centers with CCUs in Türkiye. However, it is unlikely that the results will be adversely affected due to selection according to Türkiye's regional distribution. Secondly, the interventional possibilities of the centers (e.g., extracorporeal membrane oxygenation (ECMO) was only available in a few centers) and the skills and experiences of the operators are different. Therefore, the results of the procedure and consequently the mortality rates may be affected. However, the aim of the study was to present national data on elderly individuals in Türkiye, rather than focusing on differences. Thirdly, it is important to note that this study has a cross-sectional and observational design, which limits the ability to draw causal conclusions. Fourtly, the identification of acute infectious agents is lacking in the CCU. Fifthly, fragility analysis was not performed. Despite these limitations, the study

sheds light on current data regarding short-term prognoses and predictors of mortality in elderly patients in CCUs in Türkiye.

Conclusion

The MORCOR-TURK study's subgroup analysis of elderly patients is the most extensive and comprehensive study in Türkiye that evaluates the short-term prognosis of elderly patients admitted to CCUs. The study determined short-term prognosis data in CCUs in Türkiye and identified independent predictors for mortality in elderly patients.

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Supplement 1. Comparison of biochemical parameters in study population by age group and mortality

	Group 1 (n = 923)			Group 2 (n = 713)		
Variables	**Deceased (n = 39)**	**Survived (n = 884)**	***p***	**Deceased (n = 61)**	**Survived (n = 652)**	***p***
Glucose (mg/dL)	195(142-290)	136(105-186)	<0,001	142(121-196)	129(105-173)	<0,027
Creatinine (mg/dL)	1,7(1.25-2,5)	1,01(0,82-1,3	<0,001	1,53(1,13-1,9)	1,12(0,87-1,5)	<0,001
eGFR (ml/min)	39(20-57)	68(50-85)	<0,001	38(28-59)	52(34-71)	0,009
Sodium (mEq/L)	136(133-141)	138(136-140)	0,310	138(134-141)	138(135-140)	0,917
Potassium (mEq/L)	4,6(4,2-5,3)	4,3(4-4,7)	0,008	4,8(4,1-5,3)	4,4(4,0-4,82)	0,002
AST (U/L)	36(26-107)	26(19-44)	0,002	38(18-128)	26(19-44)	0,028
ALT (U/L)	31(19-74)	19(14-30)	<0,001	27(13-59)	18(12-30)	0,008
CRP (mg/dL)	21(6-126)	6(2,3-20)	<0,001	18(5,5-54)	8(2,9-26,5)	0,004
Albumin (g/dL)	3,3(2,9-3,8)	4(3,6-4,2)	<0,001	3,4(3-3,8)	3,8(3,4-4,1)	<0,001
Hemoglobin (g/dL)	11,7(10,4-13)	13(11,6-14,3)	<0,001	11(9,4-12,9)	12,1(10,7-13,7)	<0,001
WBC (10^3/uL)	11,2(7-16)	8,95(7,1-11)	0,026	12,3(9,2-15)	9,1(7-11,3)	<0,001
Troponin-first (ng/mL)	199(19-3036)	42(4-516)	0,014	59(17-1137)	40(5,9-361)	0,113
Troponin-high (ng/mL)	2201(23-21769)	161(13-3142)	0,087	303(17-2882)	91(9-1933)	0,405
HDL (mg/dL)	37(26-47)	41(34-49)	0,020	40(32-50)	42(35-50)	0,224
LDL (mg/dL)	89(64-102)	106(76-132)	0,027	78(58-104)	98(73-127)	0,011
T. cholesterol (mg/dL)	134(115-175)	174(136-202)	0,004	133(103-163)	164(131-195)	0,002
Triglyceride (mg/dL)	108(96-143)	117(82-164)	0,623	91(71-124)	102(72-141)	0,404

GFR, glomerular filtration rate; AST, aspartate transaminase; ALT, alanine transaminase; CRP, C reactive protein; WBC, white blood cell; HDL, high density lipoproteine; LDL, low density lipoproteine. Descriptives summarized as; median (IQR) or n (%), interquartile range [25% percentile-75%]. Group 1 is defined as young-old, aged between 65-74 years old. Group 2 is defined as old-very old, aged 75 years or older.