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Ambulance utilization versus self-transportation in acute coronary syndrome: characteristics and reasons

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ABSTRACT

Background: Timely activation of emergency medical services (EMS) is a critical determinant of outcomes in acute coronary syndrome (ACS), yet utilization rates vary widely across regions. This study examines ambulance use among ACS patients presenting to a major emergency department in Kuwait, with the aim of identifying patterns, influencing factors, and patient-reported reasons for choosing ambulance transport over self-transport.

Methods: A prospective cross-sectional survey was conducted from February to May 2025 at Farwaniya Hospital. Adult patients diagnosed with ACS and admitted within 24 hours were enrolled. Sociodemographic, clinical, and transport-related data were collected via structured questionnaires and electronic medical records. Descriptive and inferential analyses were performed to assess associations between transport mode and key variables.

Results: Of 413 enrolled patients, only 134 (34.4%) arrived by ambulance, whereas 279 (67.6%) used self-transport. Age, gender, nationality, marital status, comorbidities, education, and final diagnosis showed no significant association with transport mode. Ambulance use was higher on Wednesdays and Thursdays (p = 0.004) and during daytime hours (7:00 am-3:00 pm) (p = 0.008). Although only 1.4% of patients were aware of national ACS awareness messaging, perceived illness severity strongly influenced transport choice; 80.6% of ambulance users considered their condition serious. Self-transport was commonly chosen due to perceived speed and convenience (76.3% and 38.7%, respectively). Physician advice was associated with increased ambulance use, whereas advice from family/friends was associated with increased self-transportation.

Conclusion: Ambulance utilization among ACS patients in Kuwait requires considerable improvement despite existing guideline recommendations and recent awareness-raising initiatives. Transport decisions appear to be driven primarily by patient perceptions rather than by clinical or demographic factors. Enhancing EMS awareness, increasing physician-led education, and delivering targeted public health campaigns may help improve timely EMS activation and reduce prehospital delays.

Keywords: Acute coronary syndrome, ambulance utilization, emergency medical services, prehospital care, patient behaviour, Kuwait.

Introduction

Acute coronary syndrome (ACS) causes significant mortality and morbidity worldwide. It includes three potential life-threatening conditions: ST-elevation myocardial infarction (STEMI), non-STEMI, and unstable angina, all of which share similar clinical symptoms of acute myocardial ischemia that progress

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in severity [1]. In 2020, global data from 122 countries showed a median crude ACS mortality rate of 42 per 100,000 for men and 26.8 per 100,000 for women [2].

The primary diagnosis of ACS is made based on the clinical presentation, 12-lead electrocardiogram (ECG) interpretation, and cardiac troponin results [1]. Delay in seeking medical care among patients with symptoms of ACS increases complications and mortality rates. The Global Registry of Acute Coronary Events documented international variability in pre-hospital delays in seeking medical care among ACS patients [3]. The guidelines from the European Society of Cardiology, the American College of Cardiology (ACC), and the American Heart Association strongly support the early activation of emergency medical services (EMS) with proper field management and rapid transfer of patients with an ACS presentation [4,5]. The EMS personnel can perform rapid evaluations, including triage and ECG, as well as provide initial intervention and treatment while the patient is being transferred to a percutaneous-coronary intervention-capable hospital [1]. However, the use of EMS by patients with ACS varies across developed countries, with reported approximate rates of 54%, 49%, and 31% in the United States (US), Australia, and Canada, respectively [6-8]. In the Arab Gulf States, rates range from as low as 2% in Yemen [9] to as high as 50% in Qatar [10]. Underutilization of EMS in some regions can be attributed to several factors, including social and demographic characteristics, case severity, comorbidities, awareness of ACS symptoms, and patients' beliefs [7,8,11]. The Gulf Registry of Acute Coronary Events data indicated that only 7% of ACS patients in Kuwait arrived at the hospital by ambulance [9]. In May 2023, the Kuwait Heart Foundation (KHF) launched an awareness campaign on heart diseases using audiovisuals and social media platforms titled "My Heart" for 6 months [12] as an attempt to increase the awareness of ACS symptoms and EMS use in the country. However, the EMS underutilization persists. The current study aims to investigate EMS transport numbers and determine the factors and reasons influencing the choice of ambulance transportation among patients with ACS in Kuwait.

Materials and Methods

Study design, setting, and population

The study was a prospective cross-sectional survey conducted at the Emergency Department (ED) of Farwaniya Hospital in Kuwait. The study included a total of 413 patients who presented to the ED of the hospital, were diagnosed with ACS, and were subsequently admitted between 15 February 2025 and 15 May 2025. The diagnosis and classification of ACS were based on clinical presentation, ECG findings, and a positive cardiac troponin-I result. Patients were included in the study if the following criteria were met: (1) Age ≥18 years (2) Diagnosed as ACS in the ED and admitted to an inpatient setting within 24 hours, and (3) Agreed to participate in the study after receiving consent. Patients were excluded under following circumstances: (1) Having diseases affecting decision-making capacity (disturbed level of consciousness, hemodynamically unstable, intubated, dementia, Alzheimer's, schizophrenia), (2) Deceased after out-of-hospital cardiac arrest (OHCA), (3) Transferred from other hospitals, and (4) Enrolled in the study and revisited the ED within 30 days. Ethical approval was obtained from the Standing Committee for the Coordination of Medical and Health Research at the Ministry of Health (Ref/527).

Data collection

The data were collected through a structured questionnaire and by reviewing the electronic medical records (EMR). All patients diagnosed with an ACS in the ED consented to participate in the study by trained research physicians from the ED. Data on socio-demographics were obtained from patients, while clinical characteristics and final admission diagnosis were obtained from the EMR. Upon admission, a questionnaire assessing the patient's reasons for choosing ambulance transport to the hospital or self-transport was completed. Permission to use the questionnaire was obtained from the author before its inclusion in this study; the authors granted permission to use their questionnaire [7]. We define ambulance utilization as the use of EMS for onsite treatment and transportation to a healthcare facility, while the self-transport group includes any other means of arrival, such as driving oneself, being driven by others, taking a taxi or public transportation, or walking into the hospital.

Statistical analysis

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Baseline data were reported and presented across modes of transport (by ambulance or by self-transport). Furthermore, patients' opinions on choosing an ambulance were assessed using a questionnaire across modes of transport. Continuous variables were reported as mean and standard deviation, whereas categorical variables were reported as frequencies and percentages. Inferential statistics was applied, and the differences in distributions of demographic characteristics were compared between patients arriving by ambulance and those arriving by self-transport using the chi-square test of independence and Fisher's exact test. This enabled the assessment of whether any demographic variable was associated with the choice of transport mode. Differences across continuous scores were assessed using a Student's *t*-test. All tests were two-tailed, and a p-value < 0.05 was considered significant. Statistical analysis was conducted using SPSS v 27.0.

Results

The demographic and clinical characteristics are reported in Table 1. A total of 413 patients fulfilled the inclusion criteria and were included in the study. The number of participants who arrived by ambulance was 134 (34.4%), and more than half of the eligible participants arrived by self-transport (279, 67.6%). The mean age of the included participants was 52.16 ± 9.82 years, and age characteristics were similar across groups, thereby indicating that age did not influence the choice of mode of transport. Approximately 91% of

Table 1. *Distribution of demographic and clinical characteristics by method of arrival [13].*

		Mode of transportation		
	Total	**By ambulance** *n* = 134	**Self-transport** *n* = 279	***p* value**
Age, yrs (Mean ± SD)	52.16 ± 9.82	53.03 ± 9.36	51. 74 ± 10.03	0.56
Gender (n, %)				
Male	375 (90.8%)	122 (91.0%)	253 (90.7%)	1.0
Female	38 (9.2%)	12 (9.0%)	26 (9.3%)	
Nationality (*n*, %)				
Kuwaiti	77 (18.6%)	27 (20.1%)	50 (17.9%)	0.59
Non-Kuwaiti	336 (81.4%)	107 (79.9%)	229 (82.1%)	
Marital status (*n*, %)				
Single	17 (4.1%)	3 (2.2%)	14 (5.0%)	0.29
Married	381 (92.3%)	126 (94.0%)	255 (91.4%)	
Widowed/Divorced	15 (3.6%)	5 (3.7%)	10 (3.6%)	
Employment status (*n*, %)				
Employed	324 (78.5%)	102 (76.1%)	222 (79.6%)	0.23
Unemployed	37 (9.0%)	10 (7.5%)	27 (9.7%)	
Retired	52 (12.6%)	22 (16.4%)	30 (10.8%)	
Education level (*n*, %)				
Intermediate	90 (21.8%)	32 (23.9%)	58 (20.8%)	0.39
Primary	119 (28.8%)	43 (32.1%)	76 (27.2%)	
Secondary	108 (26.2%)	34 (25.4%)	74 (26.5%)	
College/University	96 (23.2%)	25 (18.7%)	71 (25.4%)	
Housing (*n*, %)				
Living alone	40 (9.7%)	12 (9.0%)	28 (10.0%)	0.85
Living with others	373 (90.3%)	122 (91.0%)	251 (90.0%)	
Place of presentation (*n*, %)				
Home	296 (71.7%)	198 (71.0%)	98 (73.1%)	0.89
Workplace	82 (19.9%)	57 (20.4%)	25 (18.7%)	
Public	35 (8.5%)	24 (8.6%)	11 (8.2%)	
Day of the week (*n*, %)				
Monday	48 (11.6%)	10 (7.5%)	38 (13.6%)	**0.004**
Tuesday	57 (13.8%)	19 (14.2%)	38 (13.6%)	
Wednesday	50 (12.1%)	22 (16.4%)	28 (10.0%)	
Thursday	63 (15.3%)	30 (22.4%)	33 (11.8%)	
Friday	66 (16.0%)	22 (16.4%)	44 (15.8%)	
Saturday	67 (16.2%)	20 (14.9%)	47 (16.8%)	
Sunday	62 (15.0%)	11 (8.2%)	51 (18.3%)	
Time of the day (*n*, %)				
7-15	147 (35.6%)	57 (42.5%)	90 (32.3%)	**0.008**
15-23	149 (36.1%)	52 (38.8%)	97 (34.8%)	
23-7	117 (28.3%)	25 (18.7%)	92 (33.0%)	
Initial chief complaint (*n*, %)				
Chest pain	393 (95.2%)	128 (95.5%)	265 (95.0%)	1.0
Others (dyspnoea, epigastric pain, nausea, shoulder pain, dizziness, neck & jaw pain, and palpitation)	20 (4.8%)	6 (4.5%)	14 (5.0%)	
Risk factors (*n*, %)				
Diabetes		63 (44.7%)	107 (38.3%)	0.10
Family history		19 (14.1%)	56 (20.0%)	0.17
Hypertension		65 (48.5%)	111 (39.7%)	0.11
None		21 (15.6%)	33 (11.8%)	0.52
Previous ACS		35 (26.1%)	63 (22.5%)	0.45
Obesity		8 (6.0%)	21 (7.5%)	0.68
Smoking		59 (44.0%)	145 (52.0%)	0.14
Hyperlipidaemia		28 (20.9%)	55 (19.7%)	0.79
Previous stroke		4 (3.0%)	4 (1.4%)	0.28
Diagnosis (*n*, %)				
NSTEMI	174 (42.1%)	47 (35.1%)	127 (45.5%)	0.073
STEMI	163 (39.5%)	63 (47.0%)	100 (35.8%)	
Unstable angina	76 (18.3%)	24 (17.9%)	52 (18.6%)	

Note: Bold values indicate statistically significant differences at $p < 0.05$.

participants were male, with no significant difference in gender distribution across modes of transport. Around 381 (92.3%) participants were married, 17 (4.1%) were single, and 15 (3.6%) were either widowed or divorced.

The distribution of participants across education groups was approximately equal. Forty (9.7%) participants were living alone, and the rest were living with others. Gender, nationality, marital status, employment status, education level, housing conditions, and place of presentation did not influence the choice of transport mode. The day of the week influenced the choice of mode of transport; participants relied more on ambulances on Wednesdays and Thursdays, while the frequency of self-transport also increased on certain days, specifically Sunday and Monday ($p = 0.004$).

Table 2. *Reasons for choosing ambulance vs. self-transportation [13].*

Variable	By ambulance *n* = 134 (*n*, %)	Self-transport *n* = 279 (*n*, %)
This was the easiest option	73 (54.5%)	213 (76.3%)
I thought my choice would get me to hospital in the shortest time	43 (32.1%)	108 (38.7%)
I felt my condition was serious	108 (80.6%)	139 (49.8%)
I felt my condition was not serious	14 (10.4%)	122 (43.7%)
I felt my condition was urgent	99 (73.9%)	128 (45.9%)
I felt my condition was not urgent	15 (11.2%)	89 (31.9%)
I needed pain relief quickly	68 (50.7%)	142 (50.9%)
I was aware of the KHF early warning symptoms and advice about transport	1 (0.7%)	5 (1.8%)
I was advised by my doctor	35 (26.1%)	29 (10.4%)
I was advised by others (friends/family)	28 (20.9%)	104 (37.3%)
I was advised by a helpline	1 (0.7%)	0 (0%)
I thought my symptoms were cardiac (heart) related	42 (31.3%)	79 (28.3%)
I thought my symptoms were not cardiac (heart) related	21 (15.7%)	109 (39.1%)
I was not aware of the importance of going to the hospital by ambulance when having chest pain	16 (11.9%)	95 (34.1%)
I was aware of the importance of going to the hospital by ambulance when having chest pain	25 (18.7%)	27 (9.7%)

The number of participants dependent on ambulance transport varied by time of day, with higher numbers observed between 7:00 am and 3:00 pm (p = 0.008). A higher number of participants with risk factors such as diabetes, hypertension, and previous ACS history chose to travel by ambulance; however, this finding was not significant. Similarly, a higher proportion of participants with STEMI chose ambulance transport over self-transport (47% *vs.* 35.8%); however, this difference was not significant.

Only 6 (1.4%) participants were aware of the KHF early warning symptoms and transport advice. Of these, only one opted for an ambulance, while the remaining five chose self-transport. This lack of awareness and reliance on self-transport could significantly hinder timely emergency response and delay critical care interventions, potentially increasing morbidity and mortality rates within the community.

Participants who felt their condition was serious, 108 out of 134 (80.6%), arrived by ambulance, whereas only 14 of 134 (10.4%) participants who did not perceive their condition to be serious chose the same mode of transport. A higher number of participants -213 out of 279 (76.3%)- chose self-transportation, believing it to be the easiest option, while 108 out of 279 (38.7%) believed it to be the fastest means of reaching the hospital. This highlights a critical misconception that self-transportation is faster, which often is not the case in medical emergencies and can lead to inadequate delivery of pre-hospital care and suboptimal achievement of patient outcomes. Among participants who recognized the importance of using an ambulance for chest pain, only 25 out of 134 (18.7%) arrived at the hospital by ambulance. Participants who had received advice from a doctor, the majority chose to use an ambulance (35 out of 134, 26.1%) (Table 2). Public health initiatives must prioritize educational campaigns that correct emergency transport misconceptions and highlight the life-saving responsibility of professional medical transport. Leveraging trusted advice of healthcare professionals in these efforts is essential to ensure patients make informed decisions during health crises.

Discussion

Internationally, a consistent pattern of relatively low ambulance use is noted despite the critical role of rapid medical response in ACS management. This study aimed to identify the utilization of EMS among ACS patients in Kuwait. The study revealed that only 34.4% of patients who were diagnosed with ACS arrived by ambulance. Though the figure could be considered suboptimal, it is close to the utilization rates in other developed countries, which ranged between 31% and 54% [6-8,11,14,15]. Also, the rate in our study is much higher than the previous figure, 7% from 2011 [9].

Most patients were male (91%), which could be explained by the proximity of the hospital to a large industrial area. In this study, the characteristics that did not influence the choice of mode of transport were age, gender, nationality, marital status, employment status, education level, housing conditions, place of presentation, initial chief symptoms, comorbidities, and final diagnosis. These findings are similar to those reported by Lavery et al. [7] conducted in Australia; however, a former Canadian study reported that patients with older age, female gender, a diagnosis of ACS in the ED, additional comorbidities, and low household income were more likely to use the ambulance [8]. The study conducted in China identified "being single" and "being diagnosed with STEMI" as independent factors associated with ambulance utilization with an odds ratio of 1.6 and 2.4, respectively [13].

Given that in Kuwait, the weekend falls on Friday and Saturday, this study found that ambulance usage peaked toward the end of the working week, specifically on

Wednesdays and Thursdays, and between 7:00 am and 3:00 pm (p = 0.008). Cantwell et al. [13] examined 38 studies to examine the temporal pattern of ambulance utilization. A bimodal increase in ambulance demand during the day, from 08:00 to midday and from 19:00 to midnight was observed, but on a weekday, the pattern varied by country [16]. However, that study looked at medical and trauma cases and not specifically at ACS.

Despite the 6-month awareness campaign, using audiovisuals and social media platforms named "My Heart" launched by the KHF in May 2023 [12], only 1.4% of the subjects was aware of the ACS early warning symptoms and transport advice. In Australia, the "Warning Signs Campaign" for ACS patients did not have a significant impact on increasing the utilization of ambulances or shorten prehospital delay times, yet it had some effect on community health behavior among English-speaking patients [17].

Several studies have reported limited effectiveness of public awareness campaigns on increasing ambulance use among patients with suspected ACS [7,17-20]. Educational interventions, including mass media and the personalized interventions aimed at improving ACS knowledge to increase ambulance use, suffer from heterogeneity and methodological limitations that hinder the future recommendations of these approaches. However, such strategies can still help in reducing prehospital delay when focused on patients with psychological and behavioral factors [21]. In Australia, recent studies evaluating the Warning Signs Campaign indicate that it improved treatment-seeking behavior for patients with ACS, resulting in an increase in EMS activations for chest pain and a significant reduction in fatal OHCAs [22,23].

The study found that a greater number of patients believed that self-transportation would be the easiest option and get them to the hospital in the shortest time (76.3%) and (38.7%), respectively, which are similar to other studies' findings [7,11,14,24]. While one study showed that self-transportation was associated with early arrival at the ED, another reported that more rapid treatments were ensured by the ambulance providers enroute [25]. Use of self-transportation and poor interpretation of ACS symptoms were associated with extended delays for reperfusion therapy [26].

This study compares the 81% of patients who arrived by ambulance perceived their condition as serious with the 50% who arrived by self-transportation. Those who recognized the importance of going to the hospital by ambulance when having chest pain accounted for about 19%, compared with the 10% who chose self-transportation. In Japan, the community awareness of when to call the EMS if someone develops symptoms of acute myocardial infarction was low and accounted for about 12% during the daytime and 28% at night, and holidays [27]. While in the US, 14% of patients who were diagnosed with ACS and presented initially with chest pain waited more than 12 hours before calling EMS [28]. Awareness and knowledge of seeking help while experiencing chest pain related to acute coronary syndrome is associated with a higher rate of ambulance use (Odds Ratio = 3.61) [11].

We noted that among those advised by a doctor, nearly 21% used an ambulance, compared with about 10% who used self-transportation. In contrast, friends' or family's advice had a greater impact on self-transportation, with nearly 37% using self-transportation compared to about 21% using an ambulance. Other studies found that physicians' advice led to higher ambulance use by patients [7,29], whereas others' advice led to lower non-ambulance utilization [7,14].

Public educational campaigns and programs should emphasize the importance of recognizing the full spectrum of ACS symptoms, the atypical presentations, and the necessity of activating the EMS rather than self-transporting to the hospital [30]. To improve outcomes, the community must recognize EMS as an essential healthcare provider rather than a mere transport service. By delivering early diagnoses (e.g., prehospital ECG) and life-saving interventions (e.g., cardiopulmonary resuscitation and defibrillation) in the field, EMS reduces treatment delays and mortality, ensuring patients reach the correct facility for urgent care [31]. Strategies should include mass media campaigns using repetitive messaging across diverse platforms alongside targeted, culturally and linguistically appropriate interventions developed in collaboration with local leaders and community organizations to address socioeconomic barriers [32]. Finally, to reframe EMS as a vital part of cardiac care instead of just a transport service, there must be continuous education, policy support, and unified coordination between healthcare providers, hospitals, and policymakers.

Limitations

This study has several limitations that should be acknowledged. First, as a prospective cross-sectional cohort study, this research may be prone to confounding bias; the lack of random assignment means external variables could potentially distort the observed relationship between exposure and outcome. Second, the single-center design limits the generalizability of findings primarily because the specific environment, patient population, and clinical practices of that one institution may not be representative of others. To minimize recall bias, patient interviews were conducted immediately upon admission. Finally, transportation choices were not evaluated for patients unable to provide consent and, therefore, excluded from the study, such as those with out-of-hospital cardiac arrest.

Conclusion

In Kuwait, patients presenting to the ED with confirmed ACS showed low utilization of ambulance services. Factors such as socio-demographic profile, clinical presentation, and patient perceptions influenced whether they arrived by ambulance or self-transportation to the hospital. To address this, community education efforts should be broadened to include not only the general public but also treating physicians and high-risk families, supported by a comprehensive mass media campaign.

List of Abbreviations

ACC American College of Cardiology

ACS	Acute coronary syndrome
ECG	Electrocardiogram
ED	Emergency Department
EMS	Emergency medical services
EMR	Electronic medical records
KHF	Kuwait Heart Foundation
OHCA	Out-of-hospital cardiac arrest
OR	Odds ratio
SD	Standard deviation
STEMI	ST-elevation myocardial infarction

Conflict of interest

There is no conflict of interest regarding the publication of this article.

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Consent to participate

Written consent was obtained from all the participants.

Ethical approval

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