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Knowledge and Attitudes About Acute Coronary Syndrome Among Older Patients: A Cross-Sectional Study

Yaşlı Hastaların Akut Koroner Sendrom Semptomlarına İlişkin Bilgi ve Tutumları: Kesitsel Bir Araştırma

ORIGINAL ARTICLE

ABSTRACT

Objective: Prehospital delay in seeking emergency care contributes to mortality associated with older patients with acute coronary syndrome. It is often linked with patients' knowledge and awareness of acute coronary syndrome symptoms. The study aims to assess knowledge and attitude about acute coronary syndrome symptoms among older acute coronary syndrome survivors.

Methods: A descriptive, cross-sectional survey design was used. The study sample consisted of 117 older adults admitted to the cardiology inpatient and coronary intensive care unit for acute coronary syndrome. Data were collected with the Acute Coronary Syndrome Response Index. According to the Acute Coronary Syndrome Response Index subscales, the Mann–Whitney and Kruskal–Wallis tests were used to analyze the data.

Results: Participants' knowledge score was 14.7 ± 2.10, and the attitude score was 12.0 ± 3.28. More than half of the participants (61%) were over 70% true of the cut-off for knowledge score. Most participants (>85%) recognized typical symptoms of acute myocardial infarction (nausea/vomiting and neck pain), and more than half (<65%) recognized atypical symptoms (heartburn and dizziness). Participants were not at all or a little sure about "recognition of the signs and symptoms of a heart attack in themselves (52.2%) & in others and distinguish them from other diseases (≥65%)."

Conclusion: Older patients presented moderate knowledge about symptoms, inadequate knowledge of atypical symptoms, and negative attitudes toward signs. Insufficient knowledge and negative attitudes toward acute coronary syndrome may cause prehospital delays for older patients. To minimize delays in seeking emergency treatment, education programs should target specific demographic groups in older populations with insufficient knowledge of acute coronary syndrome symptoms, which are more likely to experience atypical symptoms.

Keywords: Acute coronary syndrome, aged, attitude, knowledge, prehospital delay

ÖZ

Amaç: Acil tedaviye ulaşma sırasındaki yaşanılan gecikmeler, akut koroner sendromlu yaşlı hastaların mortalite oranlarının artışına katkıda bulunabilir. Bu durum genellikle hastaların akut koroner sendrom semptomları hakkındaki bilgisi ve farkındalığı ile ilişkilidir. Bu çalışma akut koroner sendromlu yaşlı hastaların semptomları hakkındaki bilgi ve tutumlarını değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntem: Tanımlayıcı, kesitsel bir tasarım kullanılmıştır. Araştırmanın örneklemini, akut koroner sendrom nedeniyle kardiyoloji servis ve koroner yoğun bakım ünitesine yatışı yapılan 117 yaşlı hasta oluşturmuştur. Veriler Akut Koroner Sendrom Yanıt İndeksi ile toplanmıştır. AKS-Yanıt İndeksi alt ölçeklerine göre gruplar arasındaki potansiyel farklılıkları değerlendirmek için Mann-Whitney ve Kruskal Wallis testi kullanılmıştır.

Bulgular: Katılımcıların bilgi puanı 14,7 ± 2,10 ve tutum puanı 12,0 ± 3,28'dir. Katılımcıların yarısından fazlası (%61), bilgi için kesme puanının %70'inin üzerinde doğru yanıt vermiştir. Katılımcıların çoğu (>%85) akut miyokard enfarktüsünün tipik semptomlarını (bulantı/kusma, boyun ağrısı) ve yarısından fazlası (<%65) atipik semptomları (mide ekşimesi, baş dönmesi) tanımlamıştır. Katılımcılar "kendilerinde (%52,2) ve başkalarında kalp krizi belirti/bulgularını tanıma ve diğer hastalıklardan ayırt etme (%65)" konusunda hiç emin olmadıklarını ya da biraz emin olduklarını belirtmişlerdir.

Sonuç: Yaşlı hastaların semptomları hakkındaki genel bilgi puanı ortalamasının orta düzeyde olduğu ancak atipik semptomlar hakkında bilgilerinin yetersiz olduğu ve belirtilere karşı

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olumsuz tutum sergiledikleri belirlenmiştir. AKS'ye yönelik yetersiz bilgi ve olumsuz tutumlar, yaşlı hastalarda hastane öncesi gecikmelere neden olabilir. Acil tedaviye ulaşmadaki gecikmeleri en aza indirmek için, eğitim programları, atipik semptomlar yaşama olasılığı daha yüksek olan ve AKS semptomları hakkında yetersiz bilgiye sahip yaşlı hastalar gibi özel grupları hedeflemelidir.

Anahtar Kelimeler: Akut koroner sendrom, bilgi, hastane öncesi gecikme, tutum, yaşlı

Introduction

Approximately 60% of acute coronary syndrome (ACS) hospitalizations are for patients over the age of 65, and about 85% of ACS-related deaths occur in this age group.[1] Different presentations of ACS in older patients may increase mortality rates. In older patients, typical symptoms of ACS are diagnostically less evident. In most cases of older patients, ACS presents with atypical and autonomic symptoms (dyspnea, fatigue, nausea/vomiting, diaphoresis)[2,3] overlapping with changes in consciousness, fall history, deterioration in activities of daily life, and impaired communication, rather than the typical symptoms (ischemic chest pain).[4,5] This form of presentation causes a prehospital treatment delay as patients fail to link their symptoms with ACS and seek professional help.[6] The delay in hospital admission prevents the initiation of thrombolytic therapy, which increases mortality rates.[7] Treatment succeeds when initiated within the first hour of symptom onset.[8] In contrast, research shows that patients aged 80 and over seek professional help in the first 6 hours, while patients aged 60 years and under seek professional help within 4 hours.[2,4,5]

Pretreatment delay is frequently associated with patients' knowledge, understanding, and awareness of ACS symptoms.[9,10] Knowledge of the condition is the most critical step in the early recognition of symptoms by older patients. It is followed by seeking professional help, a prompt referral to emergency services, and the early initiation of treatment. Early treatment onset depends on developing a causal relationship between symptoms and the disease, so determination plays a crucial role in acute ACS management of the older patient.[11,12] Even most studies conducted with the general patient population revealed that the patient's lack of knowledge about ACS (symptom awareness, management)[13-15] and ACS-related education effectively improved knowledge and attitudes.[16,17] However, a study on the older patient population, which is the main determinant of prehospital delays, could not be reached. To manage the burden and poor outcome of ACS in older patients, it is critical to assess the knowledge, educational needs, and attitudes.[18] In this sense, the study aimed to assess the knowledge and attitudes of older ACS survivors toward symptoms of ACS. The data identified through this study could develop appropriate interventions to improve the awareness of symptoms and reduce prehospital delays.

Methods

Study Design

This descriptive, cross-sectional study, is reported according to the Strengthening the Reporting of Observational Studies in Epidemiology statement (Figure 1).

Setting and Sample

The study was conducted at the cardiology inpatient unit and coronary intensive care unit of Başkent University Hospital in Ankara.

The study was completed with 117 patients aged 65 and over, diagnosed with ACS, who could understand Turkish and volunteered to participate. Patients with communication problems, stroke, and dementia diagnoses were not included. The sample size was calculated using a priori power analysis. The study by Riegel et al[19] was used to calculate the sample size, with a maximum change of ±1 point for each subscale, so that 79 patients were required for the knowledge subscale and 117 patients for the attitude subscale at 0.80 power and 5% type I error level. Based on the analysis, the study sample consisted of 117 patients aged 65 years or older.

Instruments

Data were collected with a data sheet and the Acute Coronary Syndrome Response Index (ACSRI). The data sheet included patients' sociodemographic characteristics (age, gender, income, and educational status) and disease characteristics (duration of disease, treatments, type of coronary heart disease, and disease risk factors). The ACSRI was developed by Riegel et al[19] in 2007 to determine patients' knowledge and attitudes toward ACS symptoms. Yıldız studied the Turkish validity and reliability of the scale in 2016. The Cronbach's alpha for the knowledge and attitude subscales was found to be 0.73 and

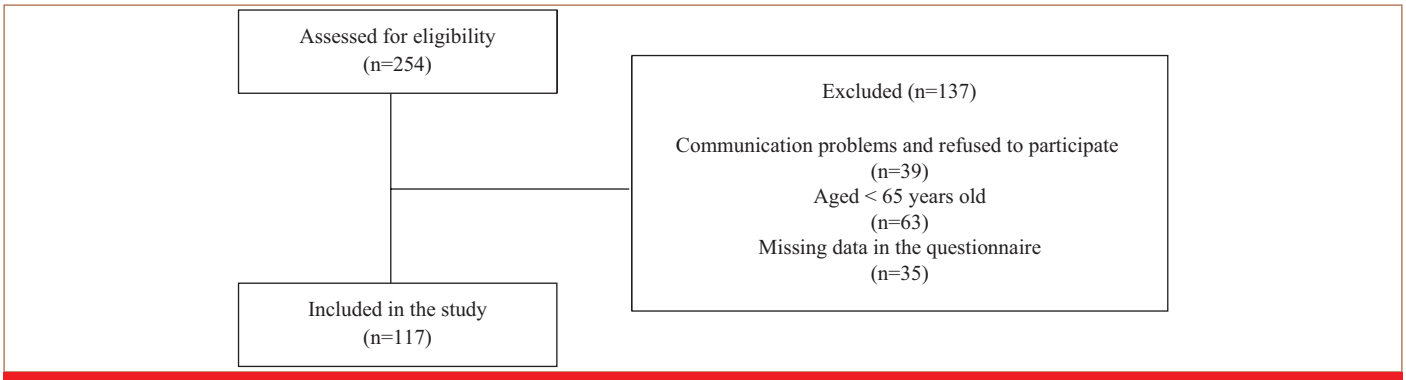

Figure 1. STROBE diagram of study. STROBE, Strengthening the Reporting of Observational Studies in Epidemiology.

0.83, respectively. In the current study, Cronbach's α was 0.72 for the knowledge scale and 0.80 for the attitude scale. The knowledge scale of the ACSRI consists of 21 2-choice items, 15 of which are concerned with ACS-related symptoms and 6 with non-ACS-related symptoms. Based on correct (1) and incorrect (0) responses, the score on the subscale ranges from 0 to 21; the higher the score, the better the knowledge. The attitude scale of the ACSRI consists of 5 items, 3 of which are concerned with recognizing ACS symptoms and 2 with seeking medical care. The items are scored on a 4-point Likert scale: not at all sure (1), somewhat sure (2), pretty sure (3), and very sure (4). The score on the subscale ranges from 5 to 20; the higher the score, the more likely patients are to recognize ACS symptoms and seek medical care.

Data Collection

The researcher informed the patients about the aim and procedure of the study and obtained informed consent from those willing to participate. The researcher reached 254 inpatients. Among those, 137 were not eligible (63 were aged under 65, 39 did not agree to participate, and 35 failed to fill out the questionnaire), and the study was completed with 117 patients. Patients were given study instruments in their rooms to fill out on their own. Upon completion, the instruments were returned to the researcher. The average time for completion was 10-15 minutes.

Ethical Considerations

The study was approved by Hacettepe University's Institutional Review Board (Approval Nu: #17/379-30). All participants gave written informed consent to participate in the study. The research was conducted in accordance with the Declaration of Helsinki.

Data Analysis

Data analysis was performed using the Statistical Package for Social Sciences version 23.0 (IBM SPSS Corp., Armonk, NY, USA) package program. Descriptive data are presented as numbers, percentages, mean, median, minimum–maximum, and standard deviation. The conformity of the data to the normal distribution was determined by the Kolmogorov–Smirnov test over the age variable ($P < .05$). The cut-off point for knowledge level was defined as 70% for "true" answers. Those below 70% were taken as "lower knowledge" (4). Mann–Whitney *U*-test and Kruskal–Wallis test were used to compare 2 or more independent groups. The level of significance for statistical analysis was set at $P < .05$.

Results

Sample Characteristics

The mean age of patients was 69.82 ± 4.71 years (range: 65-88), 59.8% were men, 30% were graduated from university, and 72.7% were unemployed/retired. Almost 66% (65.8%) of patients were diagnosed with ACS for more than 6 months (Table 1).

Table 1. Clinical Characteristics of Patients (n = 117)

	n	%
Duration of diagnosis		
Current	40	34.2
6 months and over	77	65.8
ACS diagnosis		
USAP	79	67.5
NSTEMI	23	19.7
STEMI	15	12.8
Risk factors[§]		
Hypertension	88	75.2
Hypercholesterolemia	84	71.8
Family history	80	68.4
History of cardiac surgery	75	64.1
Current smoker	74	63.3
Diabetes mellitus	56	47.9
History of myocardial infarction	41	35.0
Regular physical activity[¶]	41	35.0
Premature menopause[ŧ] (n = 47)	11	23.4
Regular alcohol consumption[†]	18	15.4

NSTEMI, non-ST elevation myocardial infarction; STEMI, ST-elevation myocardial infarction; USAP, unstable angina pectoris.

[§]Multiple responses, n is doubled.

[¶]Physical activity is defined as half an hour of walking 3 times per week.

[ŧ]Premature menopause was accepted as menopause starting at age 40 and younger.

[†]WHO standards, 4 standard drinks per week for men and 2 standard drinks per woman are included in the group.

Description of Knowledge and Attitudes Toward Acute Coronary Syndrome

The mean score on the ACSRI knowledge scale was 14.7 ± 2.10 (range 7-18), which, when converted to percent, is 56.5% ± 8.09% (range 26.9%-69.2%). With a cut-off of 70% or higher, 61% were above the cut-off for the knowledge score.

Most participants (>85%) recognized typical symptoms of AMI, such as chest pain, fatigue, diaphoresis, chest discomfort, and arm/shoulder pain, but fewer recognized nausea/vomiting (65.8%) and neck pain (65%). More than half (<65%) of the participants recognized atypical symptoms, such as heartburn and jaw pain. With regard to non-ACS-related symptoms, 86.3% of patients recognized numbness/tingling in the arm or hand and 24% knew about lower abdominal pain (Table 2).

The mean score obtained by patients on the attitude scale was 12.0 ± 3.28 (range 5-20). More than half of participants (≥65%) reported being sure or very sure "they could help for themselves and others if they thought they or someone else were having a heart attack." Participants (52.2%) reported being not at all sure or a little sure "they could recognize the signs and symptoms of a heart attack in themselves." Most participants (≥65%) reported not being at all sure or a little sure "they could recognize symptoms of ACS in others and distinguish them from those of other diseases" (Table 3).

Table 2. Correct and Incorrect Answers for ACS Symptoms (n = 117)

Common Symptoms	Agreed	%
Chest pain/pressure/tightness	110	94.0
Weakness/fatigue	110	94.0
Diaphoresis	107	91.5
Chest discomfort (heaviness, burning, tenderness)	104	88.9
Arm pain or shoulder pain	102	87.2
Shortness of breath/difficulty breathing	102	87.2
Pale, ashen, loss/change of color	101	86.3
Palpitations/rapid heart rate	100	85.5
Back pain	97	82.9
Loss of consciousness/fainting	80	68.4
Nausea/vomiting	77	65.8
Neck pain	76	65.0
Heartburn/indigestion/stomach problem	72	61.5
Dizziness, light-headedness	71	60.7
Jaw pain	53	45.3
Non-ACS-related symptoms		
Numbness/tingling in arm or hand (r)	101	86.3
Headache (r)	62	53.0
Slurred speech (r)	59	50.4
Arm paralysis (r)	53	45.3
Cough (r)	39	33.3
Lower abdominal pain (r)	29	24.8

ACS, acute coronary syndrome; r, reverse coded for calculation of knowledge score.

Sociodemographic Factors and Clinical Characteristics Associated with Knowledge and Attitudes

The knowledge levels of patients were not associated with sociodemographic factors or clinical characteristics ($P > .05$). Patients with a higher level of education, more income, longer (6 months and over) duration for ACS disease, regular physical activity, and naturally timed menopause had more appropriate attitudes toward ACS ($P < .05$) (Table 4).

Discussion

Our findings are among the first to describe the knowledge and attitudes among older patients hospitalized for ACS. The study results revealed that older patients had moderate knowledge of ACS. However, patients had inadequate knowledge of atypical symptoms. Older patients were not confident in recognizing symptoms of ACS in themselves or others and could not distinguish them from those of other diseases.

Knowledge levels of older patients were lower than those of general patients from studies reported in Ireland and Jordan,[20,21] higher than in a study in Ethiopia and Malaysia,[13,17] and like the study of Lebanese patients.[15] In the study by Chau et al.[7] insufficient knowledge of ACS symptoms was seen, especially among those with lower education levels and those aged ≥75 years. It is thought that the educational status and age of the sample and cultural differences contribute to the differences between the results. However, in the study of Birnbach et al.[22] cardiac patients were found to have a higher level of knowledge than the general patient population. In this respect, it can be thought that our sample consisted of patients who survived ACS and also influenced the moderate level of knowledge. The fact that the level of knowledge in the study by Johnson et al.[14] which examined the level of knowledge in patients without ACS, was quite low compared to other studies may confirm this theory. Also, an average knowledge score is a pleasing result, as prehospital delays in ACS treatment can be reduced.

Our study showed that patients were knowledgeable about the "typical" symptoms like chest pain, light-headedness, dizziness or fainting, diaphoresis, discomfort or pain in the arm/shoulder, and shortness of breath/difficulty in breathing significant symptoms. As reported in studies, older adults are knowledgeable and aware of the typical symptoms, with "chest pain" being the leading symptom.[7,13] Though these patients were admitted to the hospital experiencing these changes, it was easy for them to identify the leading sign and others. However, patients had inadequate knowledge of atypical symptoms. Older patients failed to recognize symptoms such as heartburn or nausea and vomiting. Patients fail to notice the atypical symptoms, still focusing on and linking the disease with well-known symptoms. For most people and older adults, it is difficult to interpret less prevalent ACS symptoms as potentially cardiac-related.[23] A lack of discussion with

Table 3. Patients' Attitudes About Symptom Recognition and Seeking Help (n = 117)

	Not at All Sure/A Little Sure		Pretty Sure/Very Sure	
Item	n	%	n	(%)
Could recognize the signs and symptoms of a heart attack in someone else	78	66.7	39	33.3
Could recognize the signs and symptoms of a heart attack in yourself	61	52.2	56	47.8
Could tell the difference between a heart attack and other medical problems	94	80.3	23	19.7
Could get help for someone if someone was having a heart attack	38	32.5	79	67.5
Could get help for yourself if you thought you were having a heart attack	38	32.5	79	67.5

Table 4. Patient Demographic/Clinical Factors and ACSRI Attitude Scores (n = 117)

Demographics Factors	n	Attitude Scale Median (minimum-maximum)	*P*
Gender			
Female	47	12 (5-18)	.531
Male	70	12 (5-19)	
Education			
Illiterate	17	10 (6-17)	**.004**
Primary school	43	11 (5-16)	
High school	57	13 (7-19)	
Income*			
Income = Expense1	54	12.5 (5-19)	**<.001**
Income > Expense2	20	14 (9-18)	
Expense > Income3	43	11 (5-17)	
Duration of diagnosis			
Current	40	11 (5-18)	**.028**
6 months and over	77	12 (5-19)	
ACS history			
USAP	79	12 (5-19)	.45
NSTEMI	23	12 (5-18)	
STEMI	15	12 (5-18)	
Coronary intervention			
Angiography	69	12 (5-19)	.665
Stent	48	12 (5-18)	
Family history			
Yes	80	12 (5-19)	.52
No	37	12 (7-18)	
History of myocardial infarction			
Yes	41	12 (5-19)	.288
No	76	12 (5-18)	
History of cardiac surgery			
Yes	75	12 (5-19)	.577
No	42	12 (5-18)	
Hypercholesterolemia			
Yes	84	12 (5-18)	.126
No	33	11 (5-19)	
Hypertension			
Yes	88	12 (5-19)	.457
No	29	12 (5-18)	
Diabetes mellitus			
Yes	56	12 (5-18)	.119
No	61	12 (5-19)	
Current smoker			
Yes	74	12 (5-19)	.105
No	43	12 (5-17)	
Regular physical activity			
Yes	41	12 (7-19)	**.011**
No	76	12 (5-18)	
Regular alcohol consumption			
Yes	18	12 (5-19)	.831
No	99	12 (5-19)	
Premature menopause			
Yes	9	9 (5-13)	**.011**
No	38	12 (5-18)	

NSTEMI, non-ST elevation myocardial infarction; STEMI, ST-elevation myocardial infarction; USAP, unstable angina pectoris.

*Multiple comparison 1-2 *P*: .233, 1-3 *P* < .001, 2-3 *P* < .001.

and education of patients about ACS atypical symptoms could also be a contributing factor to low knowledge and consciousness.[21] Therefore, the attribution of symptoms to a non-cardiac origin is the primary predictor of a prehospital delay of 6 and more hours, the patients' limited knowledge of atypical symptoms may pose a risk of prehospital delay.[16,24]

Knowledge of ACS symptoms is the first step in demonstrating appropriate patient behavior.[9] Good knowledge of ACS symptoms, combined with a proper attitude in the presence of a health threat, will force the person into action.[20] The total mean score obtained in the Attitudes subscale was higher than that obtained by Brazilian[14] and Ethiopian patients[13]; however, it is lower than that obtained by Lebanese patients[15] Notwithstanding that all older patients in this study experienced an ACS event, they reported a lack of confidence in recognizing symptoms in themselves and others. Moreover, patients said that they could not distinguish a heart attack from other medical problems. This finding highlights the potential causes for the persistent issue of prehospital delays and the resulting mortality and morbidity related to ACS. According to the findings, it is necessary to explain to patients what an ACS episode is and how to identify and treat it. Participants reported that they were pretty sure that they could get help for themselves or someone if they thought they had a heart attack. This result is consistent with the literature.[15,23] Older patients need to seek medical help and feel competent in this regard in terms of early access to medical care.

In this study, sociodemographic characteristics, clinical characteristics, and ACS risk factors among older people were not associated with knowledge level but had a positive effect on attitudes toward the disease. Patients with bachelor's

degrees, income higher than their expenses, and a diagnosis longer than 6 months showed positive attitudes toward the disease. Noureddine et al[15] and O'Brien et al[23] also reported that sociodemographic characteristics do not affect patients' level of knowledge. On the other hand, McKinley et al[16] stated that patients' level of knowledge increases with an increase in income and education. This is also confirmed by some studies suggesting that patients with higher education have more positive attitudes toward their health condition.[17,20,23] These results indicate that education is essential in health decisions and in promoting positive health behaviors.

The results also show that older people who are physically active and naturally timed menopause have more positive attitudes toward the disease. This relationship between regular physical activity and positive attitudes indicates that attitudes turn into actions in the next stage. Besides, given that physically active people are more prone to health-protective behaviors, a natural relationship between recognizing symptoms and acting in this regard can be expected.

Limitations

The study has some limitations. First, because non-random selection was used, this research was unable to completely eliminate the possibility of selection bias, which could limit the generalizability of the results. Second, we did not try to find out where patients get their expertise and information. It might be worthwhile to investigate this further in the future.

Conclusions

Older patients presented moderate knowledge about symptoms, inadequate knowledge of atypical symptoms, and negative attitudes toward signs. To minimize delays in seeking emergency treatment, nursing education programs should target specific demographic groups in older populations with insufficient knowledge of ACS symptoms who are more likely to experience atypical symptoms. Future research is needed to better comprehend the issue and fill in the gaps that have been identified.

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References

1. Tsao CW, Aday AW, Almarzooq ZI, et al. American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics subcommittee. Heart disease and stroke statistics–2022 update: a report from the American Heart Association. *Circulation*. 2022;145(8):e153-e639. [CrossRef]
2. Kueller A, Hippe HJ, Frey N, Luedde M. Atypical symptoms of a fatal myocardial infarction in an elderly patient. *Geriatr Gerontol Int*. 2016;16(2):279-281. [CrossRef]
3. American Heart Association. AHA/ACC guideline for the management of patients with non–ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;64(24):139-228. [CrossRef]
4. Lattuca B, Kerneis M, Zeitouni M, et al. Elderly patient with ST-segment elevation myocardial infarction: a patient-centered approach. *Drugs Aging*. 2019;36(6):531-539. [CrossRef]
5. Grosmaitre P, Le Vavasseur O, Yachouh E, et al. Significance of atypical symptoms for the diagnosis and management of myocardial infarction in elderly patients admitted to emergency departments. *Arch Cardiovasc Dis*. 2013;106(11):586-592. [CrossRef]
6. Priscilla P, Coţe IA, Popescu MI. Acute coronary syndromes in the elderly: impact of age on diagnosis and therapeutic management. *J Inter Med*. 2019;16(1):59-66. [CrossRef]
7. Chau PH, Moe G, Lee SY, et al. Low level of knowledge of heart attack symptoms and inappropriate anticipated treatment-seeking behavior among older Chinese: a cross-sectional survey. *J Epidemiol Community Health*. 2018;72(7):645-652. [CrossRef]
8. European Society of Cardiology. *Guidelines for the Management of Acute Coronary Syndromes in Patients Presenting without Persistent ST-Segment Elevation*. Available at: https://www.escardio.org/Guidelines/Clinical-Practice-Guidelines; 2020.
9. Leonardi S, Bueno H, Ahrens I, Hassager C, Bonnefoy E, Lettino M. Optimised care of elderly patients with acute coronary syndrome. *Eur Heart J Acute Cardiovasc Care*. 2018;7(3):287-295. [CrossRef]
10. McKee G, Mooney M. O'Donnell S et al. Multivariate analysis of predictors of prehospital delay in acute coronary syndrome. *Int J Cardiol*. 2013;168(3):2706-2713. [CrossRef]
11. Garrido D, Petrova D, Catena A, Ramírez-Hernández JA, Garcia-Retamero R. Recognizing a heart attack: patients' knowledge of cardiovascular risk factors and its relation to prehospital decision delay in acute coronary syndrome. *Front Psychol*. 2020;11:2056. [CrossRef]
12. Petrova D, Garcia-Retamero R, Catena A, et al. Numeracy predicts risk of prehospital decision delay: a retrospective study of acute coronary syndrome survival. *Ann Behav Med*. 2017;51(2):292-306. [CrossRef]
13. Demisse L, Alemayehu B, Addissie A, Azazh A, Gary R. Knowledge, attitudes and beliefs about acute coronary syndrome among patients diagnosed with acute coronary syndrome, Addis Ababa, Ethiopia. *BMC Cardiovasc Disord*. 2022;22(1):444. [CrossRef]
14. Johnson CAH, Pitta NC, Dessotte CAM, Dantas RAS, Rossi LA. Knowledge, attitudes, and beliefs about acute coronary syndrome among patients with type 2 diabetes. *Rev Lat Am Enfermagem*. 2021;29:e3503. [CrossRef]
15. Noureddine S, Dumit NY, Maatouk H. Patients' knowledge and attitudes about myocardial infarction. *Nurs Health Sci*. 2020;22(1):49-56. [CrossRef]
16. McKinley S, Dracup K, Moser DK, et al. The effect of a short one-on-one nursing intervention on knowledge, attitudes and beliefs

related to response to acute coronary syndrome in people with coronary heart disease: a randomized controlled trial. *Int J Nurs Stud*. 2009;46(8):1037-1046. [CrossRef]
17. Darsin Singh SK, Ahmad A, Rahmat N, Hmwe NTT. Nurse-led intervention on knowledge, attitude and beliefs towards acute coronary syndrome. *Nurs Crit Care*. 2018;23(4):186-191. [CrossRef]
18. Ouellet GM, Geda M, Murphy TE, et al. Prehospital delay in older adults with acute myocardial infarction: the comprehensive evaluation of risk factors in older patients with acute myocardial infarction study. *J Am Geriatr Soc*. 2017;65(11):2391-2396. [CrossRef]
19. Riegel B, McKinley S, Moser DK, Meischke H, Doering L, Dracup K. Psychometric evaluation of the acute coronary syndrome (ACS) response index. *Res Nurs Health*. 2007;30(6):584-594. [CrossRef]
20. O'Brien F, McKee G, Mooney M, O'Donnell S, Moser D. Improving knowledge, attitudes and beliefs about acute coronary syndrome through an individualized educational intervention: a randomized controlled trial. *Patient Educ Couns*. 2014;96(2):179-187. [CrossRef]
21. Alfasfos N, Darawad MW, Nofal B, Samarkandi O. Knowledge, attitudes, beliefs and perceived risk of acute coronary syndrome among Jordanian patients. *Health*. 2016;8(15):1830-1844. [CrossRef]
22. Birnbach B, Höpner J, Mikolajczyk R. Cardiac symptom attribution and knowledge of the symptoms of acute myocardial infarction: a systematic review. *BMC Cardiovasc Disord*. 2020;20(1):445. [CrossRef]
23. O'Brien F, O'Donnell S, McKee G, Mooney M, Moser D. Knowledge, attitudes, and beliefs about acute coronary syndrome in patients diagnosed with ACS: an Irish cross-sectional study. *Eur J Cardiovasc Nurs*. 2013;12(2):201-208. [CrossRef]
24. Albarqouni L, Smenes K, Meinertz T, et al. Patients' knowledge about symptoms and adequate behaviour during acute myocardial infarction and its impact on delay time: findings from the multicentre MEDEA study. *Patient Educ Couns*. 2016;99:1845-1851. [CrossRef]