

1 **Symptom recognition and treatment-seeking behaviors in women experiencing acute**
2 **coronary syndrome for the first time: A qualitative study**

3 **Running Head: Experience of ACS**

4

5 Elnaz Asghari, BSc, MSc, PhD¹; Leila Gholizadeh, BSc, MSc, PhD²; Leila Kazami, BSc³;

6 Mohammadreza Taban Sadeghi, MD⁴; Ahmad Separham, MD⁴; Naser Khezerloy-aghdam,

7 MD⁴

8

- 9 1. Faculty of Nursing and Midwifery, Tabriz University of Medical science, Tabriz, Iran
10 2. Faculty of Health, University of Technology Sydney, Sydney, Australia
11 3. Shahid Madani Hospital, Tabriz University of Medical science, Tabriz, Iran
12 4. Cardiovascular Research Center, Tabriz University of Medical science, Tabriz, Iran

13

14 Corresponding author before publication

15 Dr. Leila Gholizadeh

16 15 Broadway, Faculty of Health, University of Technology Sydney, Sydney, NSW 2007,
17 Australia

18 Phone: 00612 9514 4814

19 Email: Leila.Gholizadeh@uts.edu.au

20

21 Corresponding author after publication

22 Dr. Elnaz Asghari

23 Faculty of Nursing and Midwifery, South Shariati St. postal code: 51368

24 Tabriz University of Medical Sciences, Tabriz, East Azerbaijan, Iran

25 Email: asghariel@tbzmed.ac.ir

26

27

28

29

30 **Abstract**

31 **Background:** Women are more likely to delay medical help-seeking for ACS symptoms.
32 Understanding patients' experience of the symptoms and their response is essential in
33 improving help-seeking behaviors and timely diagnosis and treatment for ACS. This study
34 aimed to explore women's experience of ACS, their response to the symptoms, and
35 treatment-seeking decisions.

36 **Methods:** This qualitative descriptive study was conducted in a tertiary referral specialized
37 heart hospital affiliated with Tabriz University of Medical Sciences, Iran. Participants
38 included 39 women who had experienced ACS for the first time.

39 **Results:** Four main themes emerged from the analysis of interview transcripts: 1) the onset of
40 symptoms, 2) the types of symptoms, 3) response to symptoms and 4) arriving at the hospital.
41 These themes and associated sub-themes explained women's experience of ACS symptoms,
42 their response to the symptoms, and decision to seek medical help.

43 **Conclusions:** This study identified and discussed factors contributing to the prehospital delay
44 in women and their decision-making to seek medical care for ACS symptoms. The results are
45 consistent with previous research indicating that ACS symptoms in women are somewhat
46 different from men, and women tend to underestimate their symptoms and attribute them to
47 non-cardiac causes. Women should be supported to develop awareness and understanding of
48 ACS symptoms and appreciate the importance of early treatment-seeking in the disease
49 outcomes.

50 **Keywords**

51 Acute coronary syndrome; qualitative research; symptom recognition; prehospital delay;
52 help-seeking; women

53 **Background**

54 Heart disease remains the leading cause of death in men and women worldwide (1). Acute
55 coronary syndrome (ACS) is an umbrella term used to describe the clinical signs and
56 symptoms associated with impaired blood flow to coronary arteries. It includes unstable
57 angina, non-ST-segment elevation myocardial infarction, and ST-segment elevation
58 myocardial infarction (2, 3). Chest pain is the most common symptom of ACS among both
59 men and women; however, compared to men, women are more likely to present with pain
60 between the shoulder blades, nausea and vomiting, and shortness of breath, while chest pain
61 and diaphoresis are more common in men (4). Other symptoms are mainly comparable in
62 prevalence between men and women (4).

63 ACS is a time-critical condition, which means delays in diagnosis and treatment of the
64 disease can upsurge the risk of heart muscle damage, leading to increased morbidity and
65 mortality (1, 5, 6). Several patient and service level factors have been identified as affecting
66 the timely diagnosis and treatment of ACS; among them are the patient's hesitation and delay
67 in seeking medical care is a key factor (7). Mirzaei et al. found that lack of recognition of
68 ACS symptoms, the discrepancy between actual and expected symptoms, and discrepancy
69 between current symptoms and previous experience of the disease are some factors
70 contributing to delay in timely treatment seeking (6). Also, a lack of previous experience of
71 ACS affects how the symptoms are interpreted and acted upon by patients (8).

72 Evidence suggests that women are more likely than men to delay treatment seeking for ACS
73 symptoms. Factors such as anxiety, lack of knowledge of ACS symptoms, and reluctance to
74 bother others contribute to this delay among women (9). Delay in seeking medical care may
75 partially explain poorer ACS outcomes in female patients compared to their male
76 counterparts (10). Women also tend to underestimate their risk of cardiovascular disease

77 which can affect their symptom attributions to heart conditions and delay help-seeking (11).
78 In addition, women are generally underrepresented in cardiovascular research, indicating that
79 clinicians' knowledge about ACS symptoms, diagnosis, and treatment is predominantly based
80 on research on male populations (12).

81 However, increasingly sex-related anatomical, physiological, biological, and
82 psychological differences are unfolded, demonstrating differences in disease presentation,
83 diagnosis, management, and prognosis of cardiovascular disease in men and women (3). For
84 example, it is known that women have smaller coronary lumens and less collateral circulation
85 regardless of body size. These anatomical differences may increase the risk of ischemia in
86 women during periods of physical and mental stress. In addition, the prevalence of
87 psychological diseases, such as depression and anxiety, is significantly higher in women (13).
88 People with anxiety and depression are more likely to experience angina, shortness of breath,
89 dizziness, nausea, and palpitations, which overlap with ACS, further complicating ACS
90 diagnosis (6, 14). Also, patients with the comorbidity of depression are more likely to present
91 with severe and recurrent angina (2) and experience poorer outcomes than those without
92 depression (13, 14).

93 These differences suggest the need for sex and gender-specific approaches to ACS
94 assessment and management (10, 13). A better understanding of women's experience of ACS,
95 their interpretation of the symptoms, and responses are necessary to educate the public about
96 ACS and the importance of timely treatment. This knowledge can also help paramedics,
97 triage nurses, and clinicians assess, diagnose, and treat this time-sensitive condition promptly
98 (6, 15).

99 **Methods**

100 **Design**

101 This study aimed to explore women’s experience of first-time ACS and their interpretation of
102 the symptoms and responses. The study adopted a qualitative descriptive design. A
103 qualitative research approach allowed a deeper exploration of participants’ experience of
104 ACS symptoms, including their feelings, perceptions, causal attributions, and responses to the
105 symptoms and treatment-seeking behaviors.

106 **Ethical consideration**

107 The study obtained ethical approval from the Research Ethics Committee of Tabriz
108 University of Medical Science (IR.TBZMED.REC.1399.911). The researcher provided
109 potential participants with information about the purpose of the study, the data collection
110 method, potential risks and benefits, and the voluntary nature of the study. Informed written
111 consent was obtained from all participants interested in the study, and their privacy and
112 confidentiality were assured. The researchers complied with the national and local guidelines
113 when conducting the interviews during the Covid-19 pandemic.

114 **Setting**

115 This was conducted in a tertiary heart hospital affiliated with Tabriz University of Medical
116 Sciences, Iran. It is the primary referral public specialized heart hospital in northwest of Iran.

117 **Sampling**

118 Participants were recruited from the medical wards of the participating hospital. Inclusion
119 criteria were: female patients admitted to the hospital with ACS diagnosis for the first time,
120 aged 18 years and older, those who were able to speak Azerbaijani or Persian languages, and
121 provided consent to the study. All of the eligible patients who were invited to participate in
122 the study accepted our invitation. Exclusion criteria for the study were patients with recurrent
123 ACS, unstable hemodynamics, or mental and cognitive conditions that could have affected

124 their ability to provide informed consent to the research; however, none of the patients
125 screened were excluded.

126 **Data collection**

127 Data were collected using semi-structured face-to-face individual interviews. The first
128 author conducted all the interviews between December 2020 and March 2021. Participants
129 determined the time and location of the interviews; they all preferred to complete the
130 interviews in the hospital ward. A semi-structured interview guide was used; interviews
131 began with warm-up questions and then progressed to the main open-ended research
132 questions, for example, "What brought you to the hospital?", "How did the symptoms start?"
133 and "What did you do when it happened?". Probing questions were asked if needed to
134 elaborate on the details, for example, "how long did it take for you to decide to seek medical
135 help?". The interviews lasted an average of 48 ± 5.6 minutes. Researchers were to end the
136 interviews earlier if a participant asked for it or the interviewer felt that the participant was
137 uncomfortable with the interview; however, there was no such case. Researchers ceased
138 participant recruitment after 39 interviews. In the last three interviews, no new codes were
139 obtained. Examination of the themes by the research team also showed no gap. At this stage,
140 the researchers determined that data saturation had been reached; thus, no further interviews
141 were undertaken.

142 **Data analysis**

143 All interviews were audio-recorded and transcribed verbatim. The transcriptions were
144 analyzed using the MAXQDA software (2007 version, VERBI Software GmbH, Berlin,
145 Germany). Qualitative analysis of content was used for data analysis (16). In the first step,
146 data were transcribed into written text. Then, the units of analysis were selected, which
147 included individual themes. In the next step, the units of analysis were classified based on

148 their similarities and differences, leading to the formation of the initial framework of the
 149 findings. The constant comparative method was used to classify the semantic units. This
 150 method was used both for classification and for merging similar categories. The first two
 151 interviews were coded independently by two researchers (EA and RT), and the results were
 152 compared and contrasted by the third researcher (LK). Due to a high inter-coder agreement,
 153 coding was continued by EA for the remaining interviews, and new concepts and themes
 154 were added or merged into the initial framework of the findings. Interview with participant
 155 No. 21 was also coded by two researchers (EA and RT), and the results were compared
 156 independently by LK. This approach ensured the accuracy, consistency, and integrity of the
 157 coding process. Finally, the compatibility of the codes with the study themes and subthemes
 158 was re-examined, and the extracted features were compared with each other. The subthemes
 159 were compared, and their range was determined. The research team members held several
 160 meetings to discuss the pattern and compliance of the codes with the categories and
 161 subcategories (16).

162 **Results**

163 The demographics of participants are presented in Table 1. The mean age of participants was
 164 60 ± 5.2 years, ranging from 51 to 83 years. They were mainly married (71.79%), housewives
 165 (64.10%), had health insurance (79.48%), and presented to the emergency department with an
 166 accompanying family member (89.74%). A considerable number of participants (30.76%)
 167 were illiterate.

168 Table 1: Demographic characteristics of the study participants (n=39)

	Variable	Frequency	Percentage
Education	Illiterate	12	30.7

	Elementary- Mid School	21	53.8	169
	High School	3	7.6	
	University degree	3	7.6	
Marital Status	Married	28	71.7	
	Single	1	2.5	
	Widow	10	25.6	
Residential status	Rural	19	48.7	
	Urban	20	51.2	
Job	Self-employed	9	23.0	
	Retired	5	12.8	
	Housewife	25	64.1	
Health Insurance	Yes	31	79.4	
	No	8	20.5	
Arriving at the hospital	Ambulance	22	56.4	
	Personal car	17	43.5	

170

171 The analysis of the interview data revealed four main themes and 11 subthemes. The
 172 classifications of the themes and example statements are presented in Table 2.

173

Theme	Subtheme	Quotation
The onset of symptoms	Sudden onset of symptoms	<i>I was eating dinner, suddenly, I felt like the weight of a mountain on my chest. I could see my death. This should tell how it felt (p:31)</i>
	The gradual development of the symptoms	<i>I had a headache for a few days; I could not eat or do anything. It was not continuous; no, I just had to rest. It would hurt when I would get up (p: 38).</i>
The types of symptoms	Chest symptoms	<i>I had the worst world pain in my chest; it was pounding in my left hand. ... Squeezing my heart (p: 28).</i>
	Non-chest symptoms	<i>I felt suffocated, found it very difficult to breathe, sweated a lot, and my body was weak. I thought I must have gotten the Corona (p: 18).</i>
	Symptomless	<i>I was getting prepared for the surgery (knee surgery)... not sure what happened; they referred me here for a heart problem (p: 19).</i>
Response to symptoms	Using home remedies	<i>I put a hot brick on my shoulders to help relieve it (pain) (p: 25).</i>
	Ignoring symptoms	<i>In older age, you should not pay too much attention to pain; otherwise, you should be in the hospital all the time. You always have pain somewhere (p: 27).</i>

Hiding symptoms *I did not tell anyone about my symptoms. Why should I bother others? Take me to the doctor, buy me medicine, cook for me, I want to rest... (p: 34).*

Making the decision to seek medical help *I look after myself. Doctors are here to help us; all these equipment and nurses are here to help us, to take care of us (p: 29).*

The pain came, I screamed, my son came to the room, I said I am dying, call the ambulance. It (ambulance) came pretty fast (p: 24).

Arriving at the hospital Arriving by ambulance *It would be dangerous to come (to the hospital) by ourselves. In an ambulance, you are with a health team member, equipment,(p:37)*

Using a personal vehicle *Our house is over that street; walking is even faster than calling an ambulance...like explaining to the operator..... (P: 23).*

175

176

177 **1. The onset of the ACS symptoms**

178 The onset of ACS symptoms was wide-ranging in terms of the onset time, severity, and type
179 of symptoms. The onset of the symptoms could be day or night time. Only one woman
180 experienced the symptoms while sleeping, and all other women were awake when their
181 symptoms started. The onset of symptoms was sudden in some participants (n=21) but
182 gradual in others (n=18). In the sudden onset of symptoms, the severity was high from the

183 start, but in participants with gradual symptoms onset, the severity of the symptoms increased
184 progressively over time.

185 *1.1 Sudden onset of symptoms*

186 In participants whose symptoms had developed abruptly and acutely, the sudden presentation
187 caused them to focus on symptom relief more than symptom attribution. The following are
188 excerpts from participant interviews.

189 *I was lying down at night; I felt like the weight of a mountain on my chest. I thought*
190 *my chest was going to blow up from the pressure anytime (p:17)*

191 *I was so confused; I didn't know what was going on. I wasn't sure...should I focus on*
192 *finding out why I have this pain or just find a solution. Like a cat jumping down from*
193 *a wall, I was out of breath and shocked (p:7).*

194 *1.2 Gradual development of the symptoms*

195 Some participants, however, developed the symptoms gradually over time. They experienced
196 symptoms such as shortness of breath, heartburn, or high blood pressure for a couple of days.
197 The gradual and progressive development of the symptoms allowed these women time to
198 analyze and interpret their symptoms. Nevertheless, most women attributed their symptoms
199 to a non-cardiac cause, such as fluctuations in blood glucose level, acid reflux, heavy food,
200 stress, COVID-19, lung problems, muscle overuse, or aging. Acid reflux was the most
201 commonly attributed cause.

202 *After eating, I had this terrible heartburn, as if a needle was piercing my chest. I said*
203 *(to my sister): I have a stomach problem; my sister said: no, this is a gallstone*
204 *problem because it hurts after eating. (P: 15)*

205 *That day I had cold sweats; my head felt dizzy and heavy; I asked my daughter to*
206 *check my sugar; I thought my sugar had dropped again. She said my sugar was fine. I*
207 *thought she had not done it correctly, or perhaps the machine was broken. I said: no,*
208 *get me some sugar water; I know my sugar has dropped. (P: 35)*

209 **2. The types of symptoms**

210 Most women experienced chest symptoms (n= 28), including chest pain, which radiated to
211 the jaw or left arm with or without shortness of breath. However, several women presented
212 with non-chest pain symptoms (n=8), such as sweating, indigestion, nausea and vomiting,
213 palpitation, and the feeling of numbness. Three participants were symptomless.

214 *2.1 Experience of chest symptoms*

215 Most women experienced chest symptoms, such as chest pain or chest discomfort with or
216 without shortness of breath. Chest pain was radiating to the jaw or left arm. Participants
217 described their chest symptoms as *'feeling a pressure and heaviness on the chest, or a*
218 *crushing pain.'* Some participants described their chest symptoms as a feeling of tightness or
219 pressure in the chest. The most common phrases that women used to describe their chest
220 symptoms included: *'like a rock on the chest,' 'felt like a mountain', 'a very heavy object on*
221 *the chest,' 'squeezing the heart tightly in the fist', and "as if someone was pressing my heart*
222 *with his fist."* Almost all participants who had experienced chest symptoms illustrated their
223 feeling by fisting their hand or pressing their chest with a fist hand and described its severity
224 as *'very severe'* or *'deadly.'* Some participants described their chest symptoms as *'sharp*
225 *pain.'* They used phrases like *'sticking large needles into my chest'* or *'stabbing in the chest'*
226 to articulate their symptoms.

227 *Imagine simultaneously scratched by thousands of long nails (p: 33)!*

228 The intensity of the chest symptoms and shortness of breath created a sense of imminent
229 death or a death wish. Participants commonly used phrases, such as ‘*I saw death in front of*
230 *my eyes*’ or ‘*I would rather die than endure the pain,*’ to describe the severity of their pain.
231 Shortness of breath was also a chest symptom, presented in isolation or with other symptoms.
232 Breathlessness mainly occurred at night or during or after physical activity, such as doing
233 house chores.

234 *For a few days, as soon as I was lying down or doing a chore, I would feel like I was*
235 *drowning in the sea. That day (the day she came to the hospital), I could barely*
236 *breathe (p:11).*

237 2.2 Experience of non-chest symptoms

238 Several women presented with non-chest symptoms. Sweating was the most common non-
239 chest symptom, described as a sudden episode of heavy cold sweating. Pain in the epigastric
240 area, upper back, or wrist, feeling of indigestion, nausea, and vomiting were other symptoms.
241 Some women experienced palpitations. A woman described how she became aware of her
242 heart beating, which triggered her that something was wrong with her heart. Several women
243 developed numbness in different body parts, such as the back, shoulders, neck, or jaw, but the
244 numbness was more common in the left hand. In addition, a limited number of women
245 reported feeling lightheaded, lethargic, dizzy, unusual fatigue, or pale.

246 *I could not explain how I was feeling. It felt as if I was no longer on the earth, I do not*
247 *know how to explain it... like dizziness, severe fatigue, lightheadedness, or something*
248 *like that (p: 39).*

249 2.3 Symptomless

250 In three participants, the ACS condition was detected only by accident; participant No. 19
251 had had pain in her leg for an extended period and rested because of it. While in the hospital

252 for knee surgery, clinicians detected some abnormal changes in the electrocardiogram and
253 referred her to the emergency department of the participating heart hospital. In addition, two
254 participants were visiting their cardiologists for their hypertension problem when their ACS
255 was detected, and they were referred to the hospital for an emergency angiography.

256 *My cardiologist called the ambulance himself; he said you should go to the hospital*
257 *immediately. He spoke with the cardiologist in the hospital himself. I was just confused*
258 *(p: 14).*

259 **3. Response to the symptoms**

260 Participants responded to their symptoms differently, but none of them took their symptoms
261 seriously if the symptoms were not sudden and severe.

262 *3.1 Using home remedies*

263 Most women attempted to relieve their symptoms by using home remedies (n=10) if their
264 symptoms were not sudden and severe or they did not think of a cardiac origin. These
265 participants did not consider their symptoms serious enough, which needed immediate
266 medical attention. They assumed that they could treat the symptoms by using some home
267 remedies. For example, women who had attributed their pain to muscular tension used a
268 warm compress or massage as a remedy. They used emollients such as olive oil or blood-
269 boosting oils to ease the pain, like black sesame oil or pepper oil. Women who attributed their
270 symptoms to overeating or having heavy food used yogurt, lemon juice, mint, and
271 horseradish to relieve the symptoms. One participant said:

272 *I felt like all the food I had eaten was pounding in my esophagus, so I hung from a*
273 *horizontal bar to let the food down (p: 22).*

274 Another participant with a similar feeling swallowed large pieces of bread to push down
275 the food (*p*: 32). Women, who attributed their symptoms to low blood sugar levels, tried
276 something sweet, like sugar water or dates.

277 *I thought my heartburn was because of food.... I was thinking like I shouldn't have*
278 *had that meal...I tried mints to remedy the symptoms.... (P: 1)*

279 3.2 Ignoring the symptoms

280 Participants who did not have severe pain or what they considered serious symptoms tended
281 to ignore their symptoms (*n*=3). For some women, the pain was part of their life; thus, when
282 ACS occurred, they did not take the symptoms seriously that needed medical care. They
283 expected that the symptoms would resolve if they ignored them.

284 *I always have pain somewhere... my legs, knees, hands, and now my chest is an*
285 *overplus (p: 12).*

286 *In older age, you should not pay too much attention to pain; otherwise, you gotta be*
287 *in the hospital every day. You always have pain somewhere (p: 27).*

288 3.3. Hiding the symptoms

289 Some participants hid their symptoms from others (*n*=4). They expressed various reasons for
290 not disclosing their ACS symptoms. One participant shared that she was ashamed, as her
291 children had to take her to the doctor frequently due to her ill health (*p*: 2). Similarly, another
292 participant did not want to burden the family (*p*: 3).

293 One participant described that she had visited the doctor several times in the past for
294 various reasons, and each time was told that her symptoms did not have a physical origin and
295 were mental health-related. Therefore, the participant was concerned that doctors might have
296 related her symptoms to mental issues again, leading to losing the family's trust (*p*: 36).

297 *I was ashamed to tell them (my sons). They might have said in their hearts that mum*
298 *is always sick; she is old (she smiles). They wouldn't say it to be fair, they get along*
299 *very well, but I do not like to burden (p: 9).*

300 *3.4 Deciding to seek medical help*

301 A decision to seek medical help was made almost only when women experienced severe
302 symptoms (n=22). In other words, the main factor that triggered seeking care from health
303 facilities was the severity of the symptoms, especially chest pain.

304 *I could not even stand my husband putting my clothes on. I was just shouting, hurry*
305 *up, hurry up (p: 5).*

306 *"I knew that nothing and no one could help me remedy that deadly pain except the*
307 *hospital (p: 4).*

308 Nevertheless, women, who were familiar with the ACS symptoms because they had seen
309 them in a family member before, decided to seek medical care quickly, even if their
310 symptoms were not severe. Two women shared seeking immediate medical help, although
311 their pain was at a moderate level. These women had previously witnessed similar symptoms
312 in their husbands and were aware of the importance of the symptoms and the necessity of
313 early medical interventions.

314 Although sudden onset, severe pain, and severe symptoms triggered participants to rush
315 to a health center, in cases where the symptoms were mild or bearable, there was a delay
316 from the onset of symptoms to deciding to seek medical help. Seeking medical treatment was
317 delayed until the person could no longer endure the pain or symptoms.

318 Delay in seeking medical help occurred due to initial hesitation about the necessity of
319 visiting an emergency department; barriers such as living in rural and remote areas also

320 caused a significant delay in accessing timely treatment. As the participating hospital is the
321 primary referral public specialized heart hospital in northwest Iran, some participants had to
322 travel hours to arrive; therefore, they missed the standard gold time for primary interventions.
323 Having negative attitude towards staff in the EDs and patients' reluctance to visit the hospital
324 during the COVID-19 pandemic emerged as other reasons for delaying medical care. These
325 women delayed seeking medical help until their condition became unbearable.

326 *I said if I go to the hospital, they'll just give me some painkillers; I'll wait to see a*
327 *specialist after the Corona (p:20)*

328 *It was hurting, I knew that something was wrong, but I told myself that I should not go*
329 *to the hospital in this situation (COVID-19 pandemic)...with my high blood pressure*
330 *and diabetes, I wouldn't survive it (if I caught COVID-19) (p: 13).*

331 4. Arriving at the hospital

332 Participants were brought to the hospital by ambulance or personal vehicle.

333 4.1 Arriving by ambulance

334 Participants brought to the hospital by an ambulance (n=18) were either referred from a small
335 hospital/medical center or had previous experience using the ambulance service for
336 themselves, a family member, or a relative. Participant No. 6, whose son had passed away
337 only a few days before the interview, had used the ambulance a few times over the preceding
338 days due to her ill health:

339 *My husband called the ambulance, and they arrived pretty fast. They know our home.*
340 *During those three days (after her son's death), I frequently felt sick, so we called*
341 *them several times (p:6).*

342 Some patients used the ambulance service because they were familiar with the service.
343 They had called an ambulance for a family member in the past or had heard about using the
344 ambulance for a relative or friend. They knew how the ambulance service operated in Iran
345 and thus felt comfortable calling the ambulance when they experienced ACS symptoms.

346 *When my son had a (car) accident, bystanders immediately called the ambulance. In*
347 *the hospital, a nurse told us he would have died of bleeding if you had brought him*
348 *late. Since then, we have decided to call an ambulance when there is a problem...*
349 *When I became like that (experienced ACS symptoms), my husband called them*
350 *immediately (p: 8).*

351 Some participants used an ambulance because they had regretted not using it in the past
352 and learned from experience to use the ambulance service in medical emergencies.

353 *When my husband had a stroke, we took her to the hospital ourselves. There, I saw*
354 *patients brought in by ambulance were receiving quicker care. Since then, we have*
355 *realized that using an ambulance is very important (p: 10).*

356 In addition, some participants called an ambulance as they evaluated their condition as
357 ‘critical’, needing immediate medical attention. They believed that the ambulance was a safer
358 option for medical emergencies due to the presence of paramedics and necessary equipment.

359 *It would be dangerous to come (to the hospital) by ourselves. In an ambulance, you*
360 *are with a health team member, equipment,(p:37)*

361 4.2 Using a personal vehicle

362 Some patients were brought to the hospital by a personal vehicle (n=21). The participants in
363 this category were two groups; the first group consisted of patients who were unfamiliar with
364 the ambulance service, as they had not used it previously. Therefore, when they experienced

365 ACS symptoms, they did not consider the ambulance an option. Below are excerpts from two
366 participants:

367 *While I was there, my husband said to my son, help put your mum in the car; it looks*
368 *like her condition is serious " (p: 19).*

369 *"We did not think about it (calling the ambulance) at all. Ummu..., they (the family)*
370 *were so frightened to see me like that (lethargic with frequent vomiting)" (p: 16).*

371 The second group included patients who held negative attitudes towards the ambulance
372 service. They assumed the ambulance would arrive late and it would be faster if they brought
373 the patient to the hospital by a personal vehicle. Further, some women did not call the
374 ambulance, as they had this wrong assumption that the ambulance service would be costly,
375 while this service is free in Iran. Another reason for not calling an ambulance was the the
376 participants' uncertainty about their eligibility for the service. Participant 26 said they did not
377 call the ambulance because they were unsure if the ambulance service would evaluate her
378 condition as critical, requiring an ambulance. She recalled when a relative called the
379 ambulance for her Covid-19 condition, but her request was refused for not being critical
380 enough.

381 *My sister said, "call an ambulance," but my husband said no, by the time the*
382 *ambulance arrives, we'll get her to the hospital ourselves (p; 31).*

383 **Discussion**

384 This study aimed to explore symptom experience and help-seeking behaviors of women who
385 developed ACS for the first time. Participants presented with a diverse range of ACS
386 symptoms, but most women experienced chest symptoms, with or without shortness of
387 breath. Some women, however, presented with non-chest symptoms, such as pain in the
388 epigastric area, upper back, or wrist, sweating, and feeling of indigestion, nausea, and

389 vomiting. Research has shown that experiencing non-chest symptoms is a factor that
390 contributes to delayed help-seeking and access to care and treatment (17).

391 In the current study, many women attributed their symptoms to a non-cardiac cause, such
392 as acid reflux, fluctuations in blood glucose level, heavy food, distress, COVID-19, lung
393 problems, muscle overuse, and aging. The inaccurate casual attributions resulted in a
394 tendency to underestimate ACS symptoms and take inappropriate actions by women, such as
395 attempting to ease the symptoms with home remedies, which further delayed seeking medical
396 care. This finding also fits with the broader literature suggesting that women tend to deny or
397 underestimate their cardiovascular risk (18); they are reluctant to identify or admit their risk
398 factors, even those well-known risk factors, such as high blood pressure or high blood
399 cholesterol (19). In a recent study, less than half of women who had developed acute
400 myocardial infarction or undergone coronary artery bypass grafting attributed their heart
401 condition to their positive family history or smoking behavior (2). Another factor that could
402 affect treatment seeking behaviors of women in this study is the type of onset of symptoms.
403 Women in our study delayed seeking help if their symptoms were mild and developed
404 gradually. They tended to take these symptoms less seriously. Supporting this finding,
405 O'Donnell et al. reported that patients who experienced slow-onset MI were more likely to
406 attribute their symptoms to a non-cardiac cardiac cause and delay treatment seeking than
407 women who experienced fast-onset MI. This finding has implications for the education of the
408 public about ACS symptoms (20, 21).

409 Our study included only women who experienced ACS for the first time. This can
410 partially explain the high rate of inaccurate causal attributions made by participants and their
411 delay in seeking medical help. A study in Jordan found that delay in the diagnosis and
412 treatment of ACS was more common in first-time ACS patients than in those with previous
413 ACS experience (22). When women experience the warning or early symptoms of ACS for

414 the first time, they may focus on symptom relief more than symptom attribution or try to
415 understand the cause of their symptoms through developing various hypotheses. They may
416 try some over-the-counter or home remedies, which result in delayed definitive treatment
417 available at the hospital (18).

418 In addition, the participant's response to the ACS symptoms was affected by the severity
419 of their symptoms. Women sought immediate medical treatment if they experienced severe
420 and intolerable symptoms regardless of their causal attribution. In contrast, those with mild or
421 moderate symptoms often delayed help-seeking until their symptoms became unbearable.
422 This finding is in line with previous research; prehospital delay is found to be shorter in
423 patients who experience severe and abrupt symptoms (15). Davis also found that pre-hospital
424 delay was more common in women with milder symptoms with a gradual onset (18). It is
425 vital that the public is educated about the ACS symptoms and encouraged to seek early
426 medical help when they suspect a cardiac cause. Smolderen et al. suggest several potential
427 points in seeking medical care (13); it is important to identify these points and work on them
428 to promote early help-seeking for ACS.

429 ACS is a time-sensitive health condition, meaning early treatment can significantly
430 improve disease outcomes. Therefore, using the ambulance service should be encouraged to
431 reduce prehospital delays (15). In the current study, women who were brought to the hospital
432 by ambulance were referred from another medical facility, had previous experience of using
433 an ambulance for themselves or family members in the past, or had learned from experience
434 to call an ambulance in an emergency. Women, who were unfamiliar with the ambulance
435 service, held misperceptions about this service, such as arriving late or charging for the
436 service, and those who were not sure about their eligibility for using an ambulance, used a
437 personal vehicle to arrive at the hospital. Understanding and addressing factors that affect

438 people's decision to call an ambulance is important in improving ambulance use and reducing
439 prehospital delays for ACS.

440 **Limitations**

441 This qualitative study recruited participants from a single center in northwest of Iran.
442 Although the participating center was a large tertiary referral hospital, our findings may not
443 be transferable to other women who experience ACS in Iran and other countries. Further, this
444 study recruited only female patients; thus, the results may not be transferable to male patients
445 with ACS.

446 **Conclusions**

447 This study shed some light on women's experience of the ACS symptoms, their symptom
448 interpretation, and their responses. The findings help identify factors contributing to
449 prehospital delay and affect women's decision-making to seek medical care for ACS. The
450 results support the findings of previous research suggesting that women may experience non-
451 chest symptoms of ACS, attribute their symptoms to a non-cardiac cause, and underestimate
452 their symptoms. These factors delay timely treatment in women. The findings also expand
453 our knowledge of factors contributing to the public's use of the ambulance service for
454 medical emergencies: health professionals and the public need to improve awareness about
455 ACS symptoms in women needs. Women should be supported to develop an accurate
456 symptom attribution and appreciate the importance of early treatment-seeking in the disease
457 outcomes.

458 **Declarations**

459 **Ethics approval and consent to participate:** This study was approved by the Research
460 Ethics Committee of Tabriz University of Medical Sciences (IR.TBZMED.REC.1399). All

461 participants provided informed consent to participate. The researchers abided by the
462 Declaration of Helsinki in the conduction of this research.

463 **Consent for publication: NA**

464 **Availability of data and material:** Data will be made available upon request.

465 **Competing interests:** No potential competing interest was reported by the authors.

466 **Authors' contributions**

467 EA designed the study and drafted the manuscript. LG acted as the critical reviewer and
468 participated in writing the manuscript. MTS & LK performed data analysis and participated
469 in writing the manuscript. AS & NK assisted with collecting data and writing the manuscript.

470 **Acknowledgments**

471 We thank participants for the time they dedicated to this study. We are also grateful to the
472 Shahid Madani Hospital's Charity for their scientific and mental support of this research. The
473 charity, with the registration number of 5140, provides financial assistance to patients in need
474 as well as working in partnership in educating patients, improving the health of clients and
475 supporting research studies.

476

477

478

479 **References**

- 480 1. Tsao CW, Aday AW, Almarzooq ZI, Alonso A, Beaton AZ, Bittencourt MS, et al. Heart Disease and
481 Stroke Statistics—2022 Update: A Report From the American Heart Association. *Circulation*.
482 2022;145(8):e153-e639.
- 483 2. Mehilli J, Presbitero P. Coronary artery disease and acute coronary syndrome in women. *Heart*.
484 2020.
- 485 3. Haider A, Bengs S, Luu J, Osto E, Siller-Matula JM, Muka T, et al. Sex and gender in cardiovascular
486 medicine: presentation and outcomes of acute coronary syndrome. *European heart journal*.
487 2020;41(13):1328-36.
- 488 4. van Oosterhout REM, de Boer AR, Maas AHEM, Rutten FH, Bots ML, SAE. P. Sex Differences in
489 Symptom Presentation in Acute Coronary Syndromes: A Systematic Review and Meta-analysis.
490 *Journal of the American Heart Association*. 2020;9(9):e014733.
- 491 5. Wah W, Pek PP, Ho AFW, Fook-Chong S, Zheng H, Loy EY, et al. Symptom-to-door delay among
492 patients with ST-segment elevation myocardial infarction in Singapore. *Emergency Medicine*
493 *Australasia*. 2017;29(1):24-32.
- 494 6. Mirzaei S, Steffen A, Vuckovic K, Ryan C, Bronas U, Zegre-Hemsey J, et al. The quality of
495 symptoms in women and men presenting to the emergency department with suspected acute
496 coronary syndrome. *Journal of Emergency Nursing*. 2019;45(4):357-65.
- 497 7. Viana M, Laszczyńska O, Araújo C, Borges A, Barros V, Ribeiro AI, et al. Patient and system delays
498 in the treatment of acute coronary syndrome. *Revista Portuguesa de Cardiologia*. 2020;39(3):123-31.
- 499 8. Forsyth R, Sun Z, Reid C, Moorin R. Rates and Patterns of First-Time Admissions for Acute
500 Coronary Syndromes across Western Australia Using Linked Administrative Health Data 2007–2015.
501 *Journal of Clinical Medicine*. 2020;10(1):49.
- 502 9. Beza L, Leslie SL, Alemayehu B, R. G. Acute coronary syndrome treatment delay in low to middle-
503 income countries: A systematic review. . *International journal of cardiology Heart & vasculature*.
504 2021;35:100823.

- 505 10. DeVon HA, Mirzaei S, Zègre-Hemsey J. Typical and Atypical Symptoms of Acute Coronary
506 Syndrome: Time to Retire the Terms? *Journal of the American Heart Association*. 2020;9(7):e015539.
- 507 11. McSweeney JC, Rosenfeld AG, Abel WM, Braun LT, Burke LE, Daugherty SL, et al. Preventing and
508 experiencing ischemic heart disease as a woman: State of the science: A statement for healthcare
509 professionals from the American Heart Association. *Circulation*. 2016;133(13):1302.
- 510 12. Jin X, Chandramouli C, Allocco B, Gong E, Lam C, Yan L. Women's participation in cardiovascular
511 clinical trials from 2010 to 2017. *Circulation*. 2020;141 (7):540-8.
- 512 13. Smolderen KG, Brush A, Dreyer RP. Psychosocial factors and recovery after acute myocardial
513 infarction in younger women. *Current Cardiology Reports*. 2019;21(6):50.
- 514 14. Gholizadeh L, Ali khan S, Vahedi F, Davidson PM. Sensitivity and specificity of Urdu version of the
515 PHQ-9 to screen depression in patients with coronary artery disease. *Contemporary nurse*.
516 2017;53(1):75-81.
- 517 15. Mirzaei S, Steffen A, Vuckovic K, Ryan C, Bronas UG, Zegre-Hemsey J, et al. The association
518 between symptom onset characteristics and prehospital delay in women and men with acute
519 coronary syndrome. *European Journal of Cardiovascular Nursing*. 2020;19(2):142-54.
- 520 16. Zhang Y, Wildemuth B. *Qualitative analysis of content*. 2009. USA: Libraries Unlimited Inc.
- 521 17. Davis LL, McCoy TP. An educational and skill-building intervention to improve symptom
522 recognition and interpretation in women with acute coronary syndrome: a pilot study. *Dimensions*
523 *of Critical Care Nursing*. 2019;38(1):29-37.
- 524 18. Davis LL. A qualitative study of symptom experiences of women with acute coronary syndrome.
525 *The Journal of cardiovascular nursing*. 2017;32(5):488-95.
- 526 19. Kaul P, Alexander KP, Ohman EM, Savu A, Roe MT, Goodman SG, et al. Sex and prognostic
527 significance of self-reported frailty in non–ST-segment elevation acute coronary syndromes: insights
528 from the TRILOGY ACS trial. *Canadian Journal of Cardiology*. 2019;35(4):430-7.

- 529 20. O'Donnell S, McKee G, Mooney M, O'Brien F, Moser DK. Slow-onset and fast-onset symptom
530 presentations in acute coronary syndrome (ACS): new perspectives on prehospital delay in patients
531 with ACS. *The Journal of emergency medicine*. 2014;46(4):507-15.
- 532 21. O'Donnell S, Moser DK. Slow-onset myocardial infarction and its influence on help-seeking
533 behaviors. *J Cardiovasc Nurs*. 2012;27(4):334-44.
- 534 22. Hadid LAA, Al Barmawi M, Al Hmairat NAA, Shoqirat N. Factors Associated with Prehospital
535 Delay among Men and Women Newly Experiencing Acute Coronary Syndrome: A Qualitative Inquiry.
536 *Cardiology Research and Practice*. 2020;2020:3916361.
- 537