International Journal of Nursing Studies 47 (2010) 332–341

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

Response to a cardiac event in relation to cardiac knowledge and risk perception in a Lebanese sample: A cross sectional survey

Samar Noureddine [a,*], Erika Sivarajan Froelicher [b,c,d], Abla M. Sibai [e], Habib Dakik [f]

[a] Rafic Hariri School of Nursing, American University of Beirut, P.O. Box 11-0236, Beirut 1107 2020, Lebanon
[b] Physiological Nursing, School of Nursing, University of California San Francisco, San Francisco, CA, USA
[c] Epidemiology & Biostatistics, School of Medicine, University of California San Francisco, San Francisco, CA, USA
[d] University of Jordan, Amman, Jordan
[e] Faculty of Health Sciences, American University of Beirut, Lebanon
[f] Faculty of Medicine, American University of Beirut, Lebanon

ARTICLE INFO

Article history:
Received 29 May 2009
Received in revised form 14 July 2009
Accepted 14 July 2009

Keywords:
Descriptive research
Cardiac symptoms
Cardiac event
Lebanon
Healthy adults
Knowledge
Risk perception

ABSTRACT

Background: Heart disease is the leading cause of morbidity and mortality in many countries, including Lebanon. The continuing advances in the treatment of heart disease have improved patient outcomes significantly over the years. Nevertheless, prompt treatment remains essential to treatment success, which depends on the person's early recognition of cardiac symptoms and quick seeking of care.
Objective: The purpose of the study was to examine the relationship between knowledge of symptoms of heart disease, perceived cardiac risk and the potential response to a heart attack in a sample of Lebanese adults.
Design: A cross sectional descriptive survey design was used. A convenience sample of 399 adult hospital visitors who did not have heart disease were interviewed in two major referral hospitals in Beirut.
Measures: The Illness Perception Questionnaire and the Behavioral Risk Factor Surveillance System were used; in addition an open-ended question was asked to elicit what the visitor would do in case he/she experienced cardiac symptoms.
Results: While most participants (94%) correctly recognized major symptoms of heart disease (like chest pain and dyspnea), they also reported irrelevant symptoms to be associated with heart disease (like irritability by 68% and muscle cramps by 52%). Only 21% of participants reported that they would seek emergency care as their first response if they were experiencing a heart attack. Knowledge of symptoms and perceived cardiac risk were not associated with the response to a heart attack. Being single was the only significant predictor of choosing the appropriate response when experiencing a cardiac event.
Conclusion: The findings suggest lack of adequate knowledge of cardiac symptoms and a high potential for inappropriate responses when symptoms occur. Public health heart health campaigns are needed to raise awareness about heart disease in Lebanon.

What is already known about the topic?

- Prompt treatment of myocardial infarction is essential to ensure positive patient outcomes.
- Patients often delay seeking care when experiencing a heart attack for a variety of reasons.

* Corresponding author. Tel.: +961 1350000x5950; fax: +961 1744476.
E-mail address: sn00@aub.edu.lb (S. Noureddine).

0020-7489/$ – see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ijnurstu.2009.07.002

- The type of symptoms experienced influences the response of Lebanese cardiac patients to a heart attack.

What this paper adds

- This study demonstrates a knowledge deficit among Lebanese adults regarding symptoms of a heart attack.
- Lebanese adults cannot estimate their health risk and are not likely to seek health care when facing a heart attack.
- Public health campaigns are needed in Lebanon to promote awareness of heart attack symptoms and appropriate responses.

1. Introduction

Heart disease remains the leading cause of morbidity and mortality in developed countries and increasingly in developing countries (Rosamond et al., 2008). In Lebanon, ischemic heart disease is identified as the leading cause of mortality (Nawfal, 2004; Sibai et al., 2001) and the most frequent admission diagnosis in public hospitals (Ministry of Public Health, 2007). Prompt treatment of acute myocardial infarction (AMI) is known to reduce mortality and morbidity, especially if initiated within 1 h of symptom onset (Berger et al., 1999; United Kingdom Heart Attack Study Collaborative Group, 1998). When experiencing symptoms of AMI, patients unfortunately often delay a median duration of 2.5–3 h in coming to the hospital (Dracup et al., 2008).

In a national study of 432 Lebanese patients admitted with AMI, 46% of patients delayed coming to the hospital more than 6 h after experiencing their symptoms, and these were less likely to receive thrombolytic therapy than those admitted earlier (Sawaya et al., 2000). Moreover, mortality was higher in those who did not receive thrombolytic treatment compared to those who did (13.3% vs. 2.4%, $p = 0.002$). Another study of 204 patients admitted with an acute coronary syndrome (ACS) to a major tertiary care center in Beirut found a median delay time from symptom onset to hospital arrival of 4.5 h, with a range between 10 min and 6.5 days (Noureddine et al., 2006). Only 4.2% of respondents reported coming to the hospital as their first response to symptoms; the most frequent responses included telling someone, taking some medication or trying self-help measures. The characteristics of symptoms, their appraisal and the initial responses to them were significant predictors of delay. Since knowledge of ACS symptoms was not examined in depth in that study, it remains unclear whether the responses observed were due to lack of knowledge, denial or both (Arefjord et al., 2002). The current study comes to fill this gap and examines the response to symptoms of AMI in a community sample of Lebanese adults in relation to the presented symptoms, their knowledge of symptoms of heart disease and their perception of their own risk for heart disease.

2. Background

2.1. Expected responses to symptoms of MI

Investigators who studied responses to AMI in community samples presented participants with case scenarios of someone having a heart attack, and then asked them what they would do in case they had that experience (Chaturverdi et al., 1997; Liao et al., 2004; Ratner et al., 2006). The most frequent responses varied between the studies and seeking emergency care was not always the most frequently reported response. Ethnic differences were also identified. For example, Americans reported seeking emergency care more often than the Japanese (83.1% vs. 56.4%) in the study of Liao et al. (2004), and South Asians more than Europeans (odds ratio 2.67, 95% confidence interval [CI] 1.49–4.73 for Hindus and 3.18, 95% CI 1.98–5.12 for Sikhs compared to Europeans) in the study by Chaturverdi et al. (1997). Ratner et al. (2006) found that the Chinese participants who were not born in Canada were less likely to seek emergency care than those born in Canada, who included indigenous Canadians, British, Scottish and Irish ethnicities (OR = 0.55, 95% CI = 0.33–0.91). Investigators also found knowledge of MI and recognition of the symptoms presented in the scenarios as cardiac to be significantly associated with reporting seeking emergency care (Chaturverdi et al., 1997; Ratner et al., 2006).

2.2. Perceived symptoms of heart disease

Studies of perceptions of heart disease were conducted in patients with ischemic heart disease and healthy adults. Goff et al. (1998) asked 1294 healthy adults: 'what are the signs and symptoms that someone may be having a heart attack', and 'which one is the most important'. The average number of reported symptoms was 3.25 (range of 3.16–3.34) and the mean number of correct symptoms reported was 2.90 (range 2.74–3.07), out of 11. Higher numbers of correct symptoms were found in non-Hispanic whites compared to other ethnic groups, middle-aged individuals compared to older adults, and people of higher socio-economic status and those with previous experience with a heart attack compared to their counterparts (Goff et al., 1998).

Other investigators asked participants to identify from a list of symptoms which ones they associated with AMI. In one study of healthy adults, most of the individuals (over 75%) surveyed expected chest pain, irregular heartbeat, inability to move, shortness of breath and sweating (Zerwic, 1998). In another study of individuals with history of heart disease in themselves or a significant other, Ryan and Zerwic (2004) identified four clusters of symptoms: traditional symptoms; symptoms attributable to gastrointestinal causes such as epigastric discomfort; non-specific symptoms such as weakness and fatigue; and variation on traditional symptoms such as back pain. Finally, in a recent study of 3522 patients diagnosed with ischemic heart disease from the US, Australia and New Zealand, Dracup et al. (2008) found that knowledge of ACS symptoms was significantly higher in women, younger individuals, the more educated, those cared for by a cardiologist and those who underwent cardiac rehabilitation. The authors also found a significant positive correlation between the patients' knowledge of cardiac symptoms and their perception of being at risk for another MI.

Investigators found in MI patients and witnesses of heart attacks that the higher the number of MI symptoms

reported, the more rapid the care seeking (Rushton et al., 1998). Moreover, MI patients were found to seek care at the hospital sooner if they experienced central chest pain, if their symptoms were rapid in onset and matched their expectations of what a heart attack would be like (Horne et al., 2000). The similarity between expected and actually experienced symptoms predicted shorter delay in seeking care in other studies of MI patients (Perry et al., 2001; Zerwic et al., 2003).

2.3. Risk perception and health seeking behaviors

Weinstein (1982, 1984, 1987) asked healthy adults how they rate their risk on a list of illnesses and the likelihood that they would engage in health protective behaviors such as diet and exercise. The author reported that people perceived their risk for diseases that can be controlled through health behaviors (such as heart disease) to be lower than that of their peers. Participants were also more likely to report engaging in behaviors to reduce their risk for diseases to which they believed they were vulnerable. Weinstein (1988) concluded that people optimistically underestimate their risk of acquiring diseases that they can control with their behavior, and thus would not perform health related protective behaviors. Thus, it is possible that the perception of risk for heart disease would influence how the individual responds in case he/she experiences a cardiac event. In the study of Rushton et al. (1998), patients who were prompt in seeking help considered themselves to be potentially at higher risk for a heart attack compared to those who delayed seeking care and those who witnessed the cardiac event.

Therefore, perceptions of cardiac symptoms have been documented to influence people's response to cardiac events and the length of time it takes them to seek health care, which in turn impacts the outcomes of treatment. Moreover, studies of health risk perception suggest a possible impact on health seeking behavior in the context of a heart attack. This study examined the theoretical responses to a cardiac event in relation to perceptions of cardiac symptoms and risk for heart disease in a Lebanese community sample. The research questions were:

1. Given a scenario where the participant is experiencing a heart attack, what is his/her likely pattern of response? Does the potential response differ by the type of scenario used (typical vs. less typical MI)?
2. Which symptoms would a sample of Lebanese adults associate with cardiac illness?
3. Is there a relationship between knowledge of heart disease symptoms and the initial response to a cardiac event?
4. Is there a relationship between health risk perception and the initial response to a cardiac event?
5. What are the predictors of the initial response to a heart attack in this sample?

3. Design and methods

The study design was descriptive cross sectional, using survey methodology. The method of data collection included interviews conducted with visitors of hospitalized patients.

The sample included visitors of patients at one private tertiary referral center and one major government hospital in Beirut, Lebanon. The two sites serve patients from various socioeconomic strata and from all regions of the country. Moreover, previous studies conducted in Lebanon support the use of hospital visitors as representative of the community (Armenian et al., 1988). Participants were recruited from visitors at in-patient units (medical, surgical, oncology, obstetric–gynecology and coronary care units). Inclusion criteria were adults aged $\geq$25 years, and visiting a patient who had been hospitalized for 7 days or less to reduce bias from information gained through potential interaction with the health care team. Visitors were excluded if they reported having heart disease. A sample size of 400 was targeted to allow enough power ($\beta = 0.20$) and α 0.05 for a logistic regression with up to eight predictors (Pedhazur, 1997). Four hundred and thirty three visitors were approached; 32 refused to participate in the study, and two did not complete the interview. Reasons for refusal were lack of time, fatigue, being anxious or in a bad mood. The final sample included 399 participants, with a response rate of 92.15%.

Once approval for the study was granted from the Institutional Review Board of The American University of Beirut and the study sites, graduate nurses were trained by the primary investigator to conduct the interviews. Each interviewer was assigned two to three units. After randomly selecting a bed number on the unit, the interviewer went to the room, approached the visitor, introduced the study and invited him/her to participate. If no visitor was present, the interviewer chose another bed number at random. If more than one visitor was present, a volunteer was sought. When the visitor agreed to participate, his/her eligibility was determined and if eligible, an informed verbal consent was secured. An information sheet about the study was given to each participant. The interviews were conducted in a private room on the unit at a time convenient to the visitor.

3.1. Instruments

For the response to symptoms of a heart attack, a panel of coronary care nurses, cardiologist and a cardiovascular clinical nurse specialist developed two scenarios, one typical of a heart attack and the other atypical. The typical scenario described a person who at work, while moving furniture, experiences severe oppressive chest pain, sweating and shortness of breath. The atypical scenario described a person sitting watching TV, who feels pain over his left shoulder, nausea, chilliness and feeling about to faint. Each participant was given one scenario at random and asked about the first thing he/she would do. Then he/she was further probed about what he/she would do in case the initial action did not help; and how long he/she would wait in case that was an option. The responses were categorized by a research assistant and double-checked by the primary investigator; there was 100% agreement on the categories. The categories were: (1) waiting for symptoms to disappear, (2) resting or relaxing, (3) self-care remedies like drinking herbal

tea or walking, (4) taking a medication, (5) telling someone, (6) calling the doctor, (7) going to the doctor's clinic, (8) calling an ambulance, (9) going to the hospital, or (10) other.

The Illness Perception Questionnaire (IPQ) was used for symptom assessment of heart disease (Weinman et al., 1996). Participants were given a list of 15 symptoms and asked if they thought that these symptoms represent heart disease. A summative score was obtained, with higher scores indicating a greater number of symptoms associated with heart disease. The original IPQ was tested in patients with myocardial infarction and translated into French, Italian, Norwegian, Samoan and Tongan. Acceptable reliability coefficients were reported (Cronbach's α 0.73–0.82) and concurrent validity was supported with moderate correlations between the scores of the IPQ and those of other similar instruments such as the Sickness Impact Profile (Weinman et al., 1996). The symptom scale version adapted to cardiac illness (Cherrington et al., 2004) was used in this study and the Cronbach's α was 0.74.

In addition, participants were asked selected questions from the Behavioral Risk Factor Surveillance System (BRFSS) about their demographics, exercise habits, tobacco use, and history of diabetes, hypertension, blood cholesterol level, family history of heart disease, height and weight (Center for Disease Control, 2005). Body mass index (BMI) was calculated in kg/m^2 and persons were classified underweight if their BMI was less than 18.5 kg/m^2, normal weight if BMI was between 18.5 and 24.9; overweight for BMI 25–30, and obese if the BMI was over 30 (National Heart Lung and Blood Institute, 1998). The validity and reliability of the BRFSS were supported in various studies (Bowlin et al., 1996; Nelson et al., 2001). Participants were also asked to what extent they thought they may be at risk of acquiring heart disease on a five-point Likert scale (0 = no risk at all to 4 = definite risk for heart disease).

The instrument was translated to Arabic and back translated to English by an independent translator not cognizant of the study. The original and back-translated versions were compared and no modifications were needed. A panel of cardiovascular nurses, cardiologist and clinical nurse specialist supported the cultural appropriateness and content validity of the instrument. Then the questionnaire was pilot tested on 12 visitors (6 from each hospital). Some participants answered 'I don't know' on some of the symptoms; thus the option 'I don't know' was added to the options 'yes' and 'no' for the questions on symptoms.

4. Data analysis

Frequencies, means and standard deviations were used to describe the sample characteristics. For the first research question, the responses to the two scenarios were classified as appropriate (1) if the participant indicated seeking emergency care (either going to a hospital or calling an ambulance), or inappropriate (0) if otherwise. Moreover, frequencies were used to describe the categories of the consecutive responses elicited for each scenario, from the first through the fifth response where applicable. The waiting time was calculated using the median. The frequencies and mean number of symptoms endorsed as indicative of heart disease were calculated for the second research question; 'don't know' and 'no' were combined into one category for the analyses. Student's *t*-test and chi-square test were used to answer the third and fourth questions. The association between demographic variables, risk perception, symptoms and response to the scenario were evaluated using Pearson *r* correlation coefficient, *t*-tests and chi-square as appropriate. Finally, logistic regression analysis was used to estimate predictors of the appropriate response to heart attack.

5. Results

5.1. Sample characteristics

Table 1 presents the participants' characteristics for the whole sample and for the groups based on the heart attack scenario given. There was equal representation of the participants by type of hospital. The mean age was 40.91 (±12.21), ranging from 25 to 76 years. Half the sample (50.6%) was less than 40 years of age, 41.1% were 41–60 years old and 8.6% were older than 60 years. The majority of the sample was women (57.9%), married (60.2%), with at least some high school education (68.7%) and earning less than $1000 per month (61.0%). The minimum wage in Lebanon is $200 per month. Most of the participants came from Beirut (43.5%), followed by 20.4% from Mount Lebanon.

Moreover, 30.2% were housewives, 23.8% were professionals, 19.7% were laborers, and the rest worked in business (10.9%), were clerical employees (6.7%) or unemployed (10.1%). As expected, visitors to the public hospital had lower income compared to those of the private hospital (68% earned <$1000 vs. 54.6%; $\chi^2 = 11.67$, $p = 0.02$), and were less educated (35.4% had college education vs. 46.1%; $\chi^2 = 20.96$, $p = 0.001$).

Fifty-two percent of participants reported family history of heart disease, 22.7% had hypertension, 11.7% diabetes mellitus and 17.2% high blood cholesterol. Most (54.1%) reported smoking cigarettes, 38.5% water pipe smoking and with 17% reporting smoking both. Forty-seven percent were overweight and 15.6% obese. Sedentary life style was found in 37.5% of the sample. There were no differences in the cardiac risk factors between the scenario groups.

The mean cardiac disease risk perception score was 1.03 (±1.01), range 0–4,with 17% perceiving no risk, 18% perceiving little or moderate risk and 10% large or definite risk. It is worth noting that 27.6% of the participants could not answer this question, or stated that they "did not know".

Significantly higher scores of risk perception were noted among those who reported having diabetes [1.80 (±0.76) vs. 1.15 (±1. 01), $p < 0.001$], hypertension [1.72 (±0.84) vs. 1.17 (±1.03), $p < 0.001$], high blood cholesterol [1.86 (±1.00) vs. 1.21 (±0.98), $p < 0.001$], and positive family history of heart disease [1.53 (±0.99) vs. 1.03 (±0.98), $p = 0.00$]. Health risk perception was also positively and significantly associated with body mass index ($r = 0.15$, $p = 0.01$). There were no significant differences between the scenario groups on any demographic or clinical variable.

Table 1
Sample characteristics by scenario group and the whole sample ($N = 399$).

Variable	Total, $N = 399$		Typical scenario, $n = 202$		Atypical scenario, $n = 197$	
	N	%	*n*	%	*n*	%
Demographic characteristics						
Hospital						
Private	204	52.2	106	52.5	98	49.7
Government	195	48.9	96	47.5	99	50.3
Age (mean ± SD)	40.91 ± 12.21		40.85 ± 12.43		40.97 ± 12.01	
Gender (male)	168	42.1	88	43.6	80	40.6
Level of education						
No schooling	26	6.5	12	6.0	14	7.1
Up to intermediate	98	24.7	54	26.9	44	22.4
High school	111	27.9	51	39.8	78	39.7
College and above	162	40.8	84	31.8	78	39.7
Work type						
Housewife	120	30.2	59	31.3	61	29.2
Professional	93	23.8	48	23.8	45	22.5
Laborer	76	19.7	38	19.3	38	19.4
Business	41	10.9	23	9.6	18	11.5
Unemployed	40	10.1	20	10.2	20	9.9
Clerical employee	27	6.7	16	5.1	11	8.0
Income						
<$1000	230	61.0	119	63.3	111	58.7
$1000–3000	115	30.5	56	29.8	59	31.2
>$3000	32	8.0	13	6.9	19	10.1
Marital status						
Married	240	60.2	120	59.4	120	60.9
Single	113	28.3	59	29.2	54	27.4
Widowed/divorced/separated	41	10.3	19	9.4	22	11.2
Region						
Beirut	173	43.5	91	45.3	82	41.6
Mount Lebanon	81	20.4	35	17.4	46	23.4
Bekaa	52	13.1	31	15.4	21	10.7
South	57	14.3	26	12.9	31	15.7
North	35	8.8	18	9.0	17	8.6
Health characteristics						
Family history of heart disease	205	52.2	104	52.3	101	52.1
Hypertension	80	22.7	50	24.9	39	20.4
Diabetes mellitus	43	11.7	19	10.3	24	13.0
Hyperlipidemia	65	17.2	41	21.0	24	13.1
Smoking cigarettes	153	54.1	70	53.4	83	54.6
Cardiac risk perception categories						
Not at all	68	17.0	40	19.8	28	14.2
Little/moderate	181	45.4	90	44.6	91	46.2
Too much	40	10.0	18	8.9	22	11.2
Don't know	110	27.6	30	26.7	56	28.4
Body mass index (mean ± SD)	26.21 ± 4.31		26.33 ± 4.55		26.09 ± 4.06	
Cardiac risk perception (mean ± SD)	1.30 ± 1.01		1.24 ± 1.03		1.37 ± 0.99	

SD = standard deviation. Some numbers do not add up to total due to missing data.

5.2. Responses to the MI scenario

Participants reported up to five consecutive actions in response to the scenarios presented. Overall, all participants provided a first response, 66% a second response, 40% a third response, 16% a fourth response and 4% gave a fifth response. The immediate seeking of emergency care, that is going to the hospital or calling an ambulance, was reported by only 21% of the sample as a first response to the symptoms of MI, regardless of whether the scenario was typical or atypical of MI (Table 2).

In the group presented with the typical MI scenario, the most frequent first response included resting, followed by seeking emergency care, self-help or calling the doctor, and informing someone. Seeking emergency care was the most frequent action in the second to fifth responses; however, it was reported by less than one-third of the sample, even as a last resort when everything else failed. Moreover, waiting for symptoms to go away continued to be used as a third and fourth course of action rather frequently.

In the group presented with the atypical scenario (Table 2), the most frequent first response included self-

Table 2
Frequencies of responses to the typical and atypical scenarios of AMI in chronological order ($N = 399$).

Response	First		Second		Third		Fourth		Fifth	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Responses to the typical scenario ($n = 202$)										
Seek emergency care[a]	42	20.8	33	23.2	22	24.7	10	26.3	2	28.6
Rest/relax	70	34.7	15	10.6	6	6.7	0	0.0	0	0.0
Self-help	19	9.4	30	21.1	4	4.5	0	0.0	0	0.0
Call doctor	19	9.4	10	7.0	8	9.0	8	21.1	1	14.3
Tell someone	17	8.4	6	4.2	8	9.0	3	7.9	1	14.3
Take medication	13	6.4	12	8.5	14	15.7	0	0.0	0	0.0
Wait	11	5.4	24	16.9	16	18.0	6	15.8	0	0.0
Go to doctor clinic	7	3.5	7	4.9	10	11.2	9	23.7	1	14.3
Other	4	2.0	5	3.5	1	1.1	2	5.3	2	28.6
Responses to the atypical scenario ($n = 197$)										
Seek emergency care[a]	42	21.3	29	23.6	14	19.5	6	22.2	3	37.5
Self-help	49	24.9	22	17.9	6	8.3	0	0.0	0	0.0
Tell someone	34	17.3	6	4.9	14	19.4	7	25.9	0	0.0
Rest/relax	32	16.2	22	17.9	3	4.2	1	3.7	0	0.0
Call doctor	17	8.6	10	8.1	11	15.3	5	18.5	1	12.5
Take medication	8	4.1	4	3.3	3	4.2	2	7.4	1	12.5
Wait	9	4.6	21	17.1	11	15.3	1	3.7	0	0.0
Go to doctor clinic	4	2.0	5	4.1	6	8.3	3	11.1	3	37.5
Other	2	1.0	4	3.3	4	5.6	2	7.4	0	0.0

[a] Seek emergency care is the appropriate response: call an ambulance or go to the hospital.

help, followed by seeking emergency care, then telling someone, then resting. Overall, seeking emergency care was the most frequent response in the second through the fifth course of action where it was reported by 37.5% of the sample, but telling someone was used most frequently as a fourth response.

The appropriateness of the first responses (seeking emergency care or not) did not vary by type of scenario, typical or atypical. However, the specific first response varied significantly by type of scenario ($\chi^2 = 35.99$, df = 9, $p < 0.001$). Compared to participants presented with the atypical scenario, those presented with the typical scenario were more likely to report resting (34.7% vs. 16.2%), but less likely to be telling someone (8.4% vs. 17.3%) or trying self-help (9.4% vs. 24.9%).

The medications reported included mostly analgesics (78.4% in the typical scenario group and 81.2% in the atypical scenario group), with only one participant reporting using nitroglycerin. Those who reported waiting for symptoms to subside expected to wait a median of 30 min (range of 1 min to 2 days) regardless of the type of scenario. In those presented with the typical scenario, 27.7% expected waiting 1–2 h and 6.6% expected waiting 1–2 days. Similarly, 35.5% of those presented with the less typical scenario expected waiting 1–2 h and 9.2% reported waiting 1–2 days.

5.3. Symptoms perceived to be associated with heart disease

Out of a list of 15 symptoms, the total number of symptoms endorsed as related to heart disease averaged

Table 3
Symptoms reported as associated with heart disease ($N = 399$).

	Yes		No		Don't know	
	n	%	*n*	%	*n*	%
Symptoms typically associated with heart disease						
Chest pain	374	94.7	15	3.8	6	1.5
Shortness of breath	372	94.2	19	4.8	4	1.0
Irregular heartbeat	357	90.4	22	5.6	16	4.1
Arm pain or numbness	342	86.6	36	9.1	17	4.3
Fatigue	325	82.3	50	12.7	20	5.1
Loss of strength	323	82.2	49	12.5	21	5.5
Increased sweating	315	79.7	50	12.7	30	7.6
Dizziness	175	44.5	168	42.7	50	12.7
Stomach discomfort	157	39.9	183	46.6	53	13.5
Nausea	177	44.9	178	45.2	39	9.9
Symptoms not typically associated with heart disease						
Irritability	267	67.6	91	23.0	37	9.4
Muscle cramps	204	51.9	145	36.9	44	11.2
Headache	139	35.2	206	52.2	50	12.7
Cough	106	26.9	229	58.1	59	15.0
Flu-like symptoms	100	25.6	226	57.8	65	16.6

NB: Some percentages do not add up to 100% due to missing data.

9.48 (±2.91). Symptoms with respective responses are shown in Table 3, grouped in two broad categories: symptoms highly likely to be associated with heart disease and those less likely to be so. The majority of participants recognized chest pain (94.7%), shortness of breath (94.2%), irregular heartbeat (90.4%), arm pain or numbness (86.6%), fatigue (82.3%), weakness (82.2%) and increased perspiration (79.7%) as related to heart disease. A relatively significant proportion did not know whether dizziness, stomach discomfort and nausea are associated with heart disease. Out of the symptoms less likely to be associated with heart disease, participants considered irritability (67.6%) and muscle cramps (51.9%) to relate to heart disease. Headache, cough and flu-like symptoms were not identified as associated with heart disease in the majority of cases (52.2%, 58.1% and 57.8%, respectively).

5.4. Relationship between the initial response, knowledge of heart disease symptom and cardiac risk perception

There was no significant association between the number or type of symptoms reported to relate to heart disease and the appropriateness of the potential first response. Similarly, perceived risk for heart disease was not significantly associated with the appropriateness of the first response to the scenarios given. Associations of the first response with the cardiac risk factors were tested but none was significant.

5.5. Predictors of an appropriate initial response

Table 4 shows the results of bivariate and multivariate logistic regression analyses between the first response to the MI scenario and study variables. In the bivariate model, education, marital status, region and income were significantly correlated with the appropriate first response. There was a tendency for more likelihood to choose an appropriate response with higher levels of education and higher income. Single individuals were the most likely to choose an appropriate first response compared to married and separated/widowed/divorced individuals. Younger participants were more likely to choose an appropriate response than older ones, but this did not reach statistical significance.

The model tested in the multivariate logistic regression analysis of the first response (appropriate or not) included gender, age, level of education, marital status, region and income, in addition to risk perception (Table 4). The model was significant ($\chi^2 = 21.9$, df = 12, $p = 0.04$) and fit the data (Hosmer and Lemeshow χ^2 test = 9.96, df = 8, $p = 0.27$),

Table 4
Logistic regression of the first expected response to the AMI scenario ($N = 371$).

Variables	Appropriate response, $n = 84$		Inappropriate response, $n = 315$		Unadjusted analysis	Adjusted analysis[a]
	n	%	n	%	OR (95% CI)	OR (95% CI)
Demographics						
Gender						
Female	46	19.9	185	80.1	1.00	1.00
Male	38	22.6	130	77.4	1.18 (0.72–1.91)	1.17 (0.69–1.96)
Age (mean ± SD)	39.02 ± 10.49		41.42 ± 12.60		0.98 (0.96–1.00)	1.05 (0.98–1.03)
Education						
Till intermediate	18	14.5	106	85.5	1.00	1.00
High school	26	23.4	85	76.6	1.80† (0.93–3.50)	1.50 (0.72–3.10)
University	40	24.7	122	75.3	1.93* (1.05–3.57)	1.25 (0.58–2.70)
Marital status						
Single	34	30.1	79	69.9	1.00	1.00
Married	47	19.2	198	80.8	0.55* (0.33–0.92)	0.52* (0.27–0.98)
Divorced	3	7.3	38	92.7	0.18** (0.05–0.64)	0.18* (0.05–0.71)
Region						
Not Beirut	39	17.3	186	82.7	1.00	1.00
Beirut	45	26.0	128	74.0	1.68* (1.03–2.72)	1.61† (0.96–2.70)
Income						
<$1000	42	18.3	188	81.7	1.00	1.00
$1000–3000	28	24.3	87	75.7	1.44 (0.84–2.48)	1.14 (0.62–2.08)
>$3000	11	34.4	21	65.6	2.35* (1.05–5.23)	2.00 (0.80–5.02)
Health variables						
Risk perception						
Not at all	11	16.2	57	83.8	1.00	1.00
Little/moderate	39	21.5	142	78.5	1.42 (0.68–2.97)	1.53 (0.70–3.31)
Too much	10	25.0	30	75.0	1.73 (0.66–4.53)	1.93 (0.70–5.32)
Don't know	24	21.8	86	78.2	1.45 (0.66–3.18)	1.33 (0.57–3.09)

OR = odds ratio; CI = confidence interval.
[a] Adjusted for all variables in the table.
* $p < 0.05$.
** $p < 0.01$.
† $0.1 < p < 0.05$.

with 77.4% of the cases overall correctly classified. The explained variance was modest (Nagelkerke R square = 0.09). The only predictor that remained significant was marital status, with being single more likely to predict an appropriate response than being married, widowed, separated or divorced. Being from Beirut predicted an appropriate response, with a marginal significance ($p = 0.07$). Higher income predicted an appropriate response in a dose–response relationship, but the association did not reach statistical significance.

6. Discussion

This study examined expected responses to symptoms of a cardiac event in a community sample of Lebanese adults. Specifically the aim of the study was to learn about the relationship between perceptions of symptoms related to cardiac illness, perceived risk for heart disease and the response to a cardiac event. Heart disease is prevalent in Lebanon, but no published studies address knowledge or beliefs about this illness. Lebanon has been going through challenging times due to the unstable situation at the political, economical and national security levels. The Ministry of Public Health sponsors general health and risk reduction campaigns to educate the public, such as promoting immunization of children and mammography screening; however, heart disease has not been addressed in these campaigns. The findings of this study raise concern over the insufficient knowledge of heart disease symptoms and inappropriate responses to cardiac events in the Lebanese community.

Several important key findings emerge from this study. Firstly, rushing to the hospital or calling for an ambulance were chosen by only one-fifth of the sample as the initial response, which is lower than what was reported by others (Chaturverdi et al., 1997; Ratner et al., 2006; Liao et al., 2004). What is of more concern is that the total frequency of seeking emergency care whether it was the first or the last response did not go beyond 33% during the episode described, and the persistent "use of waiting", especially after the first or second course of action, did not help in speeding the decision to seek help. Thus, when the initial response failed to relieve symptoms, participants proposed subsequent actions that are not necessarily more effective. One explanation for this finding is denial. In fact, a number of participants reacted to the scenario by stating that such an event would not happen to them, which could have influenced their responses. Another possibility would be the cultural preference of the Lebanese to contact someone they know, such as their own physician, rather than leaving their care to total strangers in some hospital. This concurs with the findings from Japanese participants in the study of Liao et al. (2004).

The types of responses elicited were similar to those obtained by Noureddine et al. (2006). However, the 'other' response reported by some individuals that was distinctive in this study included thinking that the problem was a stroke or hypoglycemia and thus checking blood pressure or blood sugar, mostly by those who reported having hypertension and diabetes, respectively. Moreover, in this study resorting to self-help measures was reported more frequently than telling someone, probably since this sample is healthier, younger and thus more independent, with a relatively low perceived risk of cardiac illness.

Secondly, the lack of difference of response by type of scenario is again worrisome, and suggests lack of knowledge of symptoms of a heart attack, a factor that predicted delay in the study of Lebanese ACS patients (Noureddine et al., 2006). Although the scenarios were presented without indicating to the participants that the symptoms might indicate a heart attack, these scenarios were given after a series of questions about heart disease. These findings suggest that participants did not recognize these symptoms as cardiac in origin (Chaturverdi et al., 1997; Ratner et al., 2006), did not know how to respond to cardiac symptoms, or both. Those who were given the typical scenario were more likely to choose 'resting' as their initial response compared to those presented with the atypical scenario; this action makes sense and may be appropriate as an initial response since in that case the pain was triggered by physical activity. However, the next steps endorsed if the pain persisted were not efficient, again reflecting lack of knowledge.

Participants did not accurately identify the symptoms that are characteristic of heart disease, suggesting lack of knowledge of cardiac symptoms. The symptom scale starts with a statement that "the symptoms below may or may not occur with a heart attack, please indicate whether you think the symptoms below accompany heart disease". Although typical symptoms of heart disease (chest pain, dyspnea and arm pain/numbness) were acknowledged as related to heart disease, symptoms unrelated to a heart attack, such as headache, flu-like symptoms, coughing and irritability were also endorsed. With over half of the participants reporting a family history of heart disease, they may have chosen symptoms that they have seen in their chronically ill cardiac relatives, which may relate to the illness or its treatment, such as headache due to nitrate therapy or cough due to ACE inhibitors. Irritability may be a sign of ineffective coping with cardiac illness that participants may have witnessed in their acquaintances. Frequent referrals that the participants made to their relatives or cardiac patients they knew when answering the questions about the symptoms support this speculation.

The challenge of predicting cardiovascular risk was interesting; one-third of the sample could not estimate their perceived risk. Tversky and Kahneman (1974) discussed three criteria that people use in estimating probabilities of events: (1) representativeness, or how similar to a cardiac patient they picture themselves to be; (2) availability, which is the ease with which the image of a cardiac patient comes to mind based on experience; and (3) anchoring, whereby they judge the likelihood of reaching an event using a starting point. Many participants (27%) could not answer the risk question and the majority of those who did, even those who had family history of heart disease, had an average score of less than two, out of a maximum of four. This suggests that these participants may not know the risk factors for heart disease, or have limited experience with cardiac patients, and so it is difficult for them to estimate how likely they are to acquire such illness. An alternative explanation of this finding can

be gleaned from the context of the Lebanese situation. The Lebanese have learned over the years to live day by day; planning for the future is often interrupted with unsafe incidents and wars. It may be that their preoccupation with following the daily news shifts their attention away from what possible illnesses they may acquire in the future. Moreover, the lack of mention of heart disease in the media might mitigate the salience of heart attacks and related information in the minds of people in Lebanon. Moreover, the sample is relatively young, which may limit the extent of them having a close experience with heart disease in their peers.

The lack of association between cardiac risk perception and the expected initial response may be explained by the optimistic bias reported by Weinstein (1987) and found in this sample. Although participants had a number of cardiovascular risk factors, they did not perceive themselves to be at risk for heart disease and so did not think it was necessary to seek emergency care in response to the scenarios. Alternatively, the lack of variability of the risk perception answers could account for these results.

Possible explanations for the lack of relationship between perception of symptoms and the first expected response include the small variability in the answers to the questions on symptoms, and the limited number of participants who chose the appropriate response. These findings do not concur with those of Chaturverdi et al. (1997) and Ratner et al. (2006); yet the participants were not asked in this study whether they recognized the symptoms in the scenarios as cardiac in origin. Alternatively, the participants may not distinguish the symptoms of a heart attack, as reflected in their answers to the cardiac symptoms.

The findings show that single participants, who were also younger and more educated, were more likely to respond appropriately in case of a cardiac event compared to the married, widowed or divorced, older and less educated participants. It is possible that these participants recognized the symptoms in the scenarios as cardiac and knew what needed to be done in such a case through their exposure to information about heart disease, such as via the Internet. Direct questioning of what should be done in case of a heart attack could support this explanation.

7. Conclusions and recommendations

To our knowledge, this is the first study that addresses how people in the Lebanese community might respond in case of a cardiac event. Recognizing what people expect to do does not necessarily translate in the corresponding actual behavior, but in this case, even the expected response was not optimal. The responses to questions on symptoms suggest a lack of knowledge and the need for public education about heart disease and the optimum response to a heart attack. The findings suggest that education should target especially the widowed and divorced, those with lower level of education and those living outside Beirut. Moreover, considering the low cardiovascular risk perception in this sample, future studies need to explore the mental representation of heart disease in its entirety, including causes, consequences, controllability and time line, in order to have a more comprehensive understanding.

The cross sectional design precludes making causal conclusions; yet the purpose was to provide baseline data that may be used in developing educational interventions. Moreover, interviews are threatened by social desirability; however, in this study, the answers did not appear to reflect that bias but rather a lack of knowledge of appropriate responses to a cardiac event.

The fact that these participants did not consider going to the hospital when confronted with severe symptoms is worrisome and requires further study. Such studies need to examine the decision-making processes that cardiac patients engage in when responding to a cardiac event in order to delineate the basis of their behavior.

Conflict of interest: None declared.

Funding: None.

Ethical approval: Institutional Review Approval by the American University of Beirut; reference number NUR.SN.02.

References

Arefjord, K., Hallaraker, E., Havik, O.E., Maeland, J.G., 2002. Illness understanding, causal attributions and emotional reactions in wives of myocardial infarction patients. Psychology and Psychotherapy: Theory, Research and Practice 75, 101–114.

Armenian, H., Lakkis, N., Sibai, A., Halabi, S., 1988. Hospital visitors as controls. American Journal of Epidemiology 127, 404–406.

Berger, P.B., Ellis, S.G., Holmes Jr., D.R., et al., 1999. Relationship between delay in performing direct coronary angioplasty and early clinical outcome in patients with acute myocardial infarction: results from the global use of strategies to open occluded arteries in Acute Coronary Syndromes (GUSTO-IIb) trial. Circulation 100, 14–20.

Bowlin, S.J., Morrill, B.D., Nafziger, A.N., Lewis, C., Pearson, T.A., 1996. Reliability and changes of self-reported cardiovascular risk factors using dual response: the behavioral risk factor survey. Journal of Clinical Epidemiology 49, 511–517.

Center for Disease Control, 2005. 2005 Behavioral Risk Factor Surveillance System Questionnaire. Retrieved June 26, 2006, from http://www.cdc.gov/brfss/questionnaires/english.htm.

Chaturverdi, N., Rai, H., Ben-Shlomo, Y., 1997. Lay diagnosis and health-care-seeking behavior for chest pain in South Asians and Europeans. The Lancet 350, 1578–1583.

Cherrington, C.C., Moser, D.K., Lennie, T.A., Kennedy, C.W., 2004. Illness representation after acute myocardial infarction: impact on in-hospital recovery. American Journal of Critical Care 13, 136–145.

Dracup, K., McKinley, S., Doering, L.V., Riegel, B., Meischke, H., Moser, D., Pelter, M., Carlson, B., Aitken, L., Marshall, A., Cross, R., Paul, S.M., 2008. Acute coronary syndrome. What do patients know? Archives of Internal Medicine 168, 1049–1054.

Goff Jr., D.C., Sellers, D., McGovern, P.G., Meischke, H., Goldberg, R.J., Bittner, V., Hedges, J.R., Attender, P.S., Nichaman, M.Z., for the study group, 1998. Knowledge of heart attack symptoms in a population survey in the United States—the REACT trial. Archives of Internal Medicine 158, 2329–2338.

Horne, R., James, D., Petrie, K., Weinman, J., Vincent, R., 2000. Patients' interpretation of symptoms as cause of delay in reaching hospital during acute myocardial infarction. Heart 83, 388–393.

Liao, L., Whellan, D.J., Tabuchi, K., Schulman, K.A., 2004. Differences in care seeking behavior for acute chest pain in the United States and Japan. American Heart Journal 147, 630–635.

Ministry of Public Health, 2007. Statistical Bulletin 2006. Ministry of Public Health, Beirut.

National Heart, Lung & Blood Institute, 1998. Clinical guidelines on the identification, evaluation and management of overweight and obesity: the evidence report. NIH Publication No. 98-4083. National Institutes of Health, Maryland.

Nawfal, H., 2004. Resident issues in Lebanon ten years after the world conference on residents and development: the national report 2004. Dar El Koutoub, Beirut, Republic of Lebanon.

Nelson, D.E., Holtzman, D., Bolen, J., Stanwyck, C.A., Mack, K.A., 2001. Reliability and validity of measures from the Behavioral Risk Factor Surveillance System (BRFSS). Social and Preventive Medicine 46 (Suppl. 1), S03–S42.

Noureddine, S., Adra, M., Arevian, M., Dumit, N., Puzantian, H., Shehab, D., Abchee, A., 2006. Delay in seeking health care for acute coronary syndromes in a Lebanese sample. Journal of Transcultural Nursing 17, 341–348.

Pedhazur, E.J., 1997. Multiple Regression in Behavioral Research, 3rd ed. Harcourt Brace, Orlando, FL.

Perry, K., Petrie, K., Ellis, C.J., Horne, R., Moss-Morris, R., 2001. Symptom expectations and delay in acute myocardial infarction patients. Heart 86, 91–93.

Ratner, P.A., Tzianetas, R., Tu, A.W., Johnson, J.L., Mackay, M., Buller, C.E., Rowlands, M., Reime, B., 2006. Myocardial infarction symptom recognition by the lay public: the role of gender and ethnicity. Journal of Epidemiological Community Health 60, 606–615.

Rosamond, W., Flegal, K., Furie, K., Go, A., Green lund, K., Haase, N., et al., 2008. Heart disease and stroke statistics 2008 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation 117, e25–e146.

Rushton, A., Clayton, J., Calnan, M., 1998. Patients' action during their cardiac event: qualitative study exploring differences and modifiable factors. British Medical Journal 316, 1060–1064.

Ryan, C.J., Zerwic, J.J., 2004. Knowledge of symptom clusters among adults at risk for acute myocardial infarction. Nursing Research 53, 363–369.

Sawaya, J.I., Jazra, C., Farhat, F., Alam, S., Eid, E., Sabra, R., 2000. In-hospital mortality after acute myocardial infarction in Lebanon: incidence, associations and influence of newer treatment regimens. Lebanese Medical Journal 64, 63–69.

Sibai, A.M., Fletcher, A., Hills, M., Campbell, O., 2001. Non-communicable disease mortality rates using the verbal autopsy in a cohort of middle aged and older populations in Beirut during wartime, 1983–93. Journal of Epidemiology and Community Health 55, 271–276.

Tversky, A., Kahneman, D., 1974. Judgment under uncertainty: heuristics and biases. Science 185, 1124–1131.

United Kingdom Heart Attack Study (UKHAS) Collaborative Group, 1998. Effect of time from onset to coming under care on fatality of patients with acute myocardial infarction: effect of resuscitation and thrombolytic treatment. Heart 80, 114–120.

Weinman, J., Petrie, K.J., Moss-Morris, R., Horne, R., 1996. The illness perception questionnaire: a new method for assessing the cognitive representation of illness. Psychology and Health 11, 431–445.

Weinstein, N.D., 1982. Unrealistic optimism about susceptibility to health problems. Journal of Behavioral Medicine 5, 441–460.

Weinstein, N.D., 1984. Why it won't happen to me: perceptions of risk factors and susceptibility. Health Psychology 3, 431–457.

Weinstein, N.D., 1987. Unrealistic optimism about susceptibility to health problems: conclusions from a community-wide sample. Journal of Behavioral Medicine 10, 481–500.

Weinstein, N.D., 1988. The precaution adoption process model. Health Psychology 7, 355–386.

Zerwic, J.J., 1998. Symptoms of acute myocardial infarction: expectations of a community sample. Heart & Lung 27, 75–81.

Zerwic, J.J., Ryan, C., DeVon, H., Drell, M.J., 2003. Treatment seeking for acute myocardial infarction: differences in delay across sex and race. Nursing Research 52, 159–167.