

Patients' Understanding of their Heart Attack and the Impact of Exposure to a Media Campaign on Pre-Hospital Time



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Background

Patients with acute myocardial infarction (AMI) have a limited understanding of AMI symptoms and risk factors. This can lead to delays in the recognition of an AMI and hospital presentation. We aimed to assess patients' understanding of their AMI symptoms and risk factors and also assess the impact of exposure to a media campaign on their pre-hospital time.

Methods

We surveyed 100 AMI patients admitted to the Canberra Hospital. We asked them about their AMI symptoms and risk factors and the impact of the National Heart Foundation (NHF) advertisements on their AMI experience.

Results

Only 26% of patients recognised that they were having an AMI. In 34% of cases, an ambulance was called. There was no significant difference in the median pre-hospital time between patients who encountered the NHF advertisements and those who had not (133 minutes vs. 137 minutes, $p = 0.809$). Only 22% of patients could identify all of their personal AMI risk factors.

Conclusions

Most AMI patients do not initially recognise their condition nor do they call for an ambulance. Exposure to the NHF advertisements had no significant influence on reducing pre-hospital time in this cohort. Most patients have a limited understanding of AMI risk factors and causes.

Keywords

Acute myocardial infarction • Media campaign • National Heart Foundation • Risk factors • Pre-hospital time • Ambulance transport

Introduction

Treatment with percutaneous coronary intervention or fibrinolytic therapy within one to two hours of onset of acute myocardial infarction (AMI) can reduce AMI related mortality by 50% [1–3]. However, these benefits diminish with time delays [4]. Calling for an ambulance shortly after the onset of AMI symptoms reduces the time to treatment [5,6]. Therefore timely access to AMI therapies and a better prognosis depend upon patients quickly recognising their AMI symptoms and calling for an ambulance [7,8].

The pre-hospital time represents the time from AMI symptom onset to arrival at hospital [1]. Unfortunately, over half of AMI patients delay seeking medical care for greater than six hours and patient decision time is responsible for most of this delay [1,9]. Potential reasons for the lack of recognition of an AMI may be a poor awareness of AMI symptoms and lack of awareness of one's personal risk factors for AMI. Studies have shown that patients' awareness of certain AMI symptoms can be high, however, awareness of all AMI symptoms was lower [7,8]. Previous research has also suggested that patients lack knowledge regarding certain AMI risk factors

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such as diabetes and they also have a poor understanding of the cause(s) of their AMI [10–12]. Only a small proportion of patients knew to call emergency services in the event of an AMI [8].

Recently the National Heart Foundation (NHF) in Australia initiated the “Warning Signs of Heart Attack” media campaign which ran from 2008 to 2012. The campaign featured nationally and included television advertisements as well as radio, press and internet advertisements and fact sheets. This campaign aimed to raise awareness of AMI symptoms and to reduce the time taken for a person to recognise these symptoms and call an ambulance.

We aimed to investigate patients' perceptions of their AMI symptoms and their initial reactions following the onset of these symptoms. We also aimed to assess the impact of exposure to the NHF advertisements on pre-hospital time in our patients. Patients' understanding of the risk factors that may have contributed to their AMI was also examined.

Methods

Study Population and Setting

This was a prospectively conducted study which took place at the Canberra Hospital in Australia. Participants were patients ($n = 100$) admitted to the Coronary Care Unit (CCU) with a diagnosis of AMI between November 2011 to July 2012. All participants gave written informed consent to take part in the study.

Procedure

AMI patients were identified by the research team or CCU staff according to their admission diagnosis. The patients were

unselected but not in a consecutive manner due to the constraints of human resources on carrying out the study and we invited all patients regardless of age, gender, ethnicity or language to take part. Patients were approached within one to two days of admission, informed of the nature of the study and asked to give informed consent by signing a consent form. They then completed a survey with assistance from the research team or CCU staff. The research and nursing staff were advised to provide general assistance in filling survey questions, without suggesting answers to the patients. Patient records were accessed to determine demographic and procedural data including pre-hospital time. Anonymity of patients was maintained via the de-identification of patient survey responses and via the non-disclosure of patient specific information to individuals outside the research team.

Details of Survey

The survey included 14 questions, 13 of which were in a ‘tick-a-box’ format and one question which required patients to give a written response to the question, “What do you think was the main reason you had a heart attack?” These questions are summarised in Figure 1. Patients were asked about their AMI symptoms, whether they thought they were having an AMI and what action they took following the onset of their symptoms. Patients were also asked if they had encountered the NHF advertisements, whether these helped improve their understanding of AMI symptoms and whether these influenced their decision to call an ambulance. Patients were also asked about their cardiovascular risk factors, cigarette smoking status and weekly exercise frequency, and their opinion about how healthy their diet was. Other questions related to the risk factors that patients believed contributed to their AMI.

All questions are tick boxes apart from question 6 which was open-ended.
The tick options have not been included due to space limitations.

1. What did you experience when you had the heart attack?
2. Did you think you were having a heart attack?
3. What did you do next?
4. Have you seen/heard the heart attack warning signs advertisements from the National Heart Foundation?
 - a. If yes, then where had you seen/heard about the warnings signs?
 - b. Did the advertisements help improve your understanding of the warning signs of a heart attack?
 - c. Did the advertisements influence your decision to call ‘000’ when you experienced your heart attack symptoms?
5. Have you seen/heard any other sources of information (other than from the National Heart Foundation) informing you of what to do if you were having a heart attack?
6. There could be many causes for a heart attack. What do you think was the main reason you had a heart attack?
7. Have you had high blood pressure?
8. Have you had high cholesterol levels?
9. Do you have diabetes?
10. Is there a history of heart attack in your immediate family?
11. How healthy would you say your diet is?
12. What is your cigarette smoking status?
13. How often do you exercise?
14. Which of the following do you think may have contributed to you having a heart attack?

Figure 1 Survey Questions.

AMI Definition and Risk Factors

AMI was defined according to the universal definition of AMI [13]. A history of hypertension, high cholesterol levels, diabetes, and a history of AMI in the immediate family were self-reported by patients and were considered AMI risk factors. Overweight was defined as a BMI between 25.0 and 29.9, while obesity was defined as a BMI greater than or equal to 30. An unhealthy diet (self reported), current or previous cigarette smoking and an exercise frequency of once/week or less were also considered risk factors for AMI.

Statistical Analyses

The data was analysed using SPSS statistics version 20. Categorical variables such as gender, risk factors and recognition of an AMI were summarised using percentages and compared using the Chi square test. Patients' actual AMI risk factors were compared with what they perceived to be risk factors for their AMI, and the proportion of risk factors correctly identified was determined. Pre-hospital time was expressed as a median time, since the mean can be skewed by individual patient data. A comparison of median pre-hospital time in patients who had seen the NHF advertisements and those who had not was made using an independent-samples median test. $P < 0.05$ was considered statistically significant.

Ethical Guidelines and Approval

We followed the ethical guidelines set out by the 'Statement on Human Experimentation' by the National Health and Medical Research Council of Australia. The study was approved by the Australian National University Human Research Ethics Committee and the Australian Capital Territory Health Directorate Human Research Ethics Committee (ETHLR.11.212).

Funding and Data Access

This study did not receive funding from any sources. Only the authors had full access to the data.

Results

Baseline characteristics for the cohort as well as a comparison of patients who had or had not encountered the NHF media campaign are summarised in Table 1. There was a preponderance of males among patients who had not seen the advertisements (100% male compared with 79% in those who had seen the advertisements, $p = 0.0031$). The two groups were well matched with regards to age and baseline risk factors except for a lower proportion of reported history of hypertension in the group which had not encountered the advertisements.

AMI Symptoms

The frequency of presenting symptoms is shown in Figure 2. Chest pain was the most frequent symptom but most patients had atypical symptoms. Less frequent symptoms included cold sweats, nausea, dizziness and pain in the arms, jaw, neck and back. Only 26% of patients recognised that they were experiencing an AMI following symptom onset.

Patient Actions following Onset of AMI Symptoms

Figure 3 shows the actions taken by patients shortly following the onset of AMI symptoms. In 34% of cases an ambulance was called and in 29% of these cases it was a bystander who called for an ambulance. Other actions taken by patients included calling their general practitioner or calling a medical advice number.

NHF Advertisements

In this cohort of patients, 78% reported encountering the NHF advertisements and 63% of these patients said that they helped improve their understanding of AMI symptoms. However, only 27% of patients who had seen the advertisements recognised their AMI compared with 23% of those who had not seen the advertisements ($p = 0.69$). Only 13% of

Table 1 Baseline characteristics of AMI patients who had or had not seen the National Heart Foundation advertisements.

	Total Cohort (n = 100)	Had seen ads (n = 78)	Had not seen ads (n = 22)	P value
Age	59.9 ± 13.7	59.9 ± 14.4	59.8 ± 11.5	0.97
Male sex	84 (84%)	62 (79%)	22 (100%)	0.0031
Current Smoker	32 (32%)	25 (32%)	7 (32%)	0.98
Ex- Smoker	37 (37%)	26 (33%)	11 (50%)	0.15
Diabetes	13 (13%)	12 (15%)	1 (5%)	0.14
Hypertension	44 (44%)	38 (49%)	6 (27%)	0.07
High cholesterol	46 (46%)	36 (46%)	10 (45%)	0.95
Family History	58 (58%)	44 (56%)	14 (64%)	0.54
Unhealthy Diet	18 (18%)	14 (18%)	4 (18%)	0.98
Infrequent Exercise	35 (35%)	29 (37%)	6 (27%)	0.38
Body Mass Index	27.8 ± 4.5	27.8 ± 4.7	27.7 ± 4.0	0.89
Pre Hospital Time*	134 (79-385)	133 (82-467)	137 (56-288)	0.63

*Refers to time from symptom onset to presentation at hospital.

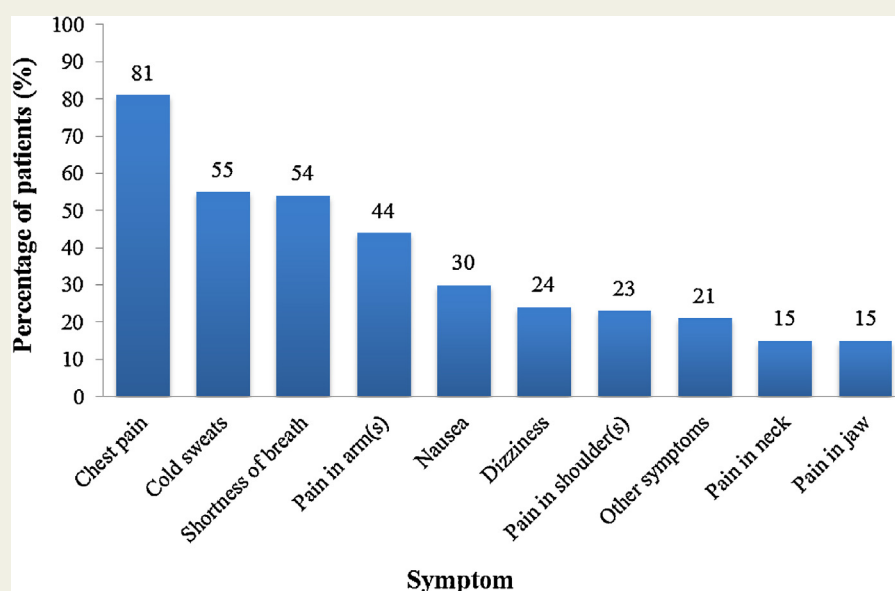


Figure 2 Percentage of AMI patients who experienced particular symptoms.

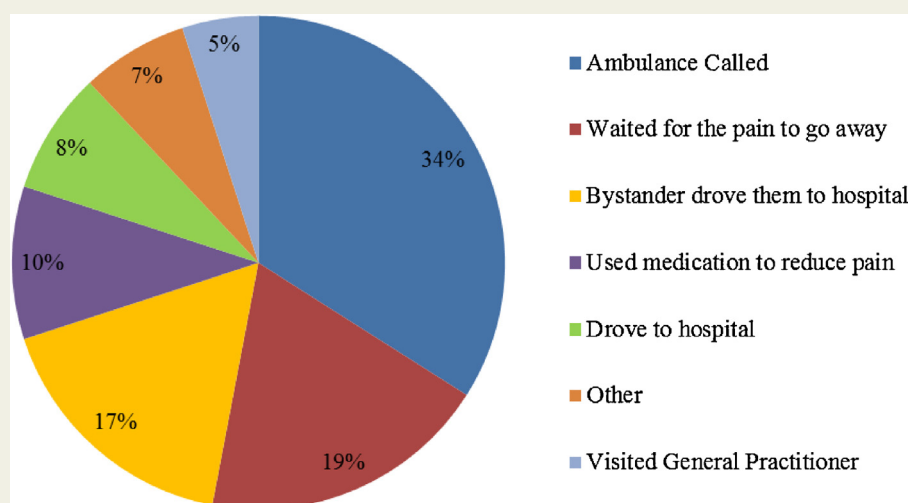


Figure 3 Frequency of various actions taken by AMI patients shortly following the onset of symptoms.

patients who encountered the advertisements said that these influenced their decision to call an ambulance. Of the patients who called an ambulance, 42% said that the NHF advertisements influenced their decision. In patients who had seen the advertisements, 24% called an ambulance, compared with 23% of those who had not ($p = 0.87$).

Impact of NHF Advertisements on Pre-hospital Time

There was no significant difference in the median pre-hospital time between patients who encountered the NHF advertisements (133 minutes, range: 15 minutes to 46 hours) and patients who had not (137 minutes, range: 24 minutes to 99 hours) ($p = 0.81$).

AMI Risk Factors

The proportion of patients with a particular AMI risk factor who correctly identified it as a risk factor was higher in patients who were current smokers (94%), aged > 65 (74%), who exercised \leq once/week (69%), who had diabetes (69%), had a family history of AMI (67%), who considered their diet to be unhealthy (67%) and who had high cholesterol levels (61%) (Figure 4). The recognition of individual risk factors was lower in patients who were ex-smokers (22%), overweight or obese (31%) and who had hypertension (50%). The mean proportion of personal risk factors correctly identified by patients was 59%. However, only 22% of patients identified all of their personal risk factors.

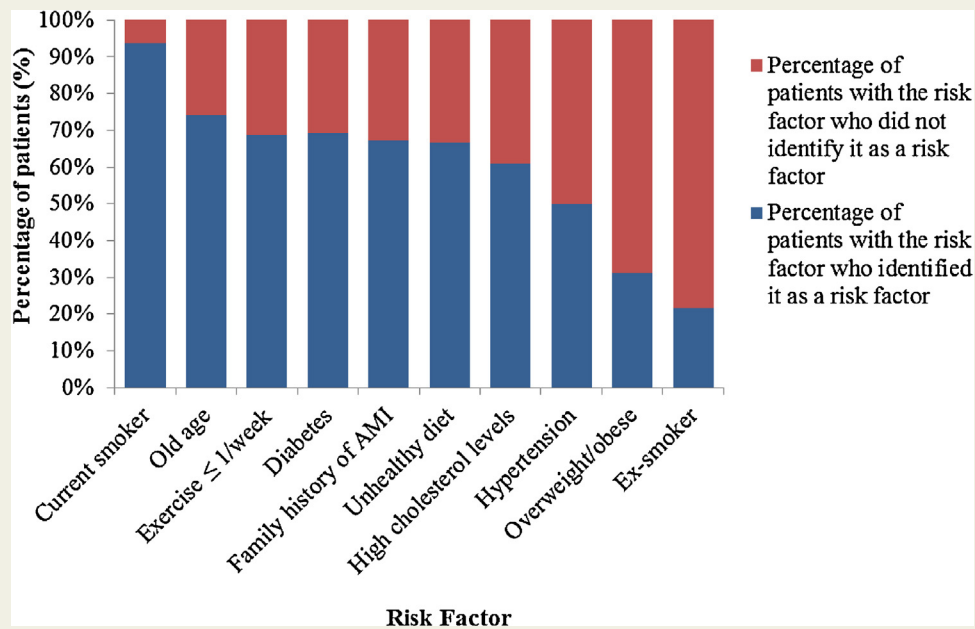


Figure 4 Percentage of AMI patients with a particular AMI risk factor who either identified or did not identify it as a risk factor.

Table 2 Main reason for AMI as reported by AMI patients.

Reason	Percentage
Stress	28%
Cigarette smoking	27%
Family history of AMI	17%
Poor or unhealthy diet	16%
High cholesterol levels	14%
Being overweight/obese	6%
Diabetes	5%
Hypertension	2%

Table 2 summarises what AMI patients thought was the main reason for their AMI. Stress was thought to be the main reason for their AMI by 28% of patients, and this included family and work related stress. Cigarette smoking was thought by 27% of patients to be the main reason for their AMI. Hypertension (2%), diabetes (5%) and being overweight/obese (6%) were infrequently identified by patients as the main reason for their AMI.

Discussion

Our study has shown that only 26% of patients recognised their AMI at the time, and only in 34% of all cases was an ambulance called. This lack of recognition is likely a major contributor to delays in seeking medical attention as evidenced by a median pre-hospital time of 134 minutes. This

pre-hospital delay is similar to those found in other Australian and international studies and does not appear to have changed greatly in the last two decades [1,5,9,14]. Furthermore, recent data from the United States (US) has indicated that reductions in door-to-balloon time over the last 10 years have not translated into reductions in mortality in AMI patients. Therefore, attention is rightly shifting towards reducing the pre-hospital time to improve patients' outcomes after AMI [15,16].

The reasons for patients' lack of recognition of an AMI are manifold and complex. The failure of some patients to recognise an AMI may be due to a lack of congruence between their actual AMI experience and what they expect it to be like [2]. For example, research has shown that over 90% of people recognise that chest pain and shortness of breath are symptoms of an AMI [7]. However, in our study, 19% of patients did not experience chest pain and 46% did not experience shortness of breath. Furthermore, the symptoms experienced may not be as severe or as dramatic as expected by patients [1]. In addition, AMI symptoms can vary and be similar to the symptoms of other diseases such as gastro-oesophageal reflux disease [17]. As a result, a patient may neglect the possibility of an AMI and avoid calling an ambulance.

Lack of insight into one's own risk of an AMI appears to be another important barrier to the recognition of a potential AMI [8]. Previous research has found that some patients judged their personal AMI risk to be low [2,12]. For example, females often consider AMI to be a male associated illness [1,2]. The ability of AMI patients to identify their own risk factors is likely to influence their perception of their risk of AMI. In our study, patients on average recognised 59% of their personal risk factors. However, important risk factors

such as a previous history of cigarette smoking, hypertension and overweight/obesity were poorly recognised. In a recent survey of patients with heart disease, only 37% correctly identified all seven components of ideal cardiovascular health (not smoking, regular exercise, healthy diet, ideal body mass index and normal cholesterol, blood pressure and blood glucose levels) [10]. Education about cardiovascular risk factors is an important part of public education regarding AMI and it may have a positive influence on earlier recognition of AMI symptoms.

It was interesting to see that stress was the most common reason regarded by patients for their AMI. Stress is generally considered to be a trigger or precipitant for an AMI and links have been made between stress and an increased risk of AMI [18,19]. Although cigarette smoking was acknowledged as a cause of some patients' AMI, it is disappointing to see that hypertension, diabetes and being overweight were very infrequently regarded as the cause of AMI. Future education campaigns should pay greater attention to highlighting these risk factors as important contributors to AMI.

Possible reasons for not calling an ambulance include failure to recognise an AMI, dismissing the possibility of an AMI, and also lack of medical or ambulance insurance. Patients who are not insured avoid calling an ambulance even when AMI symptoms are present [17,20]. In a survey of 11,000 people in Australia, 43.5% of uninsured respondents outside Queensland and Tasmania indicated that it would be too expensive to call an ambulance, even if they were experiencing a heart attack. In Queensland and Tasmania, which are the only states to have free ambulance cover, only 7.7% of people felt that it would be too expensive to call an ambulance [21]. Patients in Queensland and Tasmania also had significantly higher rates of ambulance transport to hospital for triage category 1 and 2 patients, compared to all other states [21]. Given the impact that calling an ambulance can have on reducing pre-hospital time, it is timely to consider the health benefits and costs of universal ambulance cover in Australia [20,21].

In cases where an ambulance was called, 29% were due to a bystander. Research has shown that patients do not often initially communicate with others, but when symptoms persist or get worse, patients would inform those nearby. Bystanders often encourage patients to seek medical care and are frequently the ones who call an ambulance or drive patients to hospital [2]. Our findings provide support for the value of bystanders and this has implications for future education campaigns which may need to target bystanders as well as individuals with AMI symptoms.

Our study showed that the NHF advertisements were seen by the majority of patients and most of these patients indicated that the advertisements improved their understanding of AMI symptoms. An evaluation of the NHF campaign aimed at people with known coronary heart disease reported that 95% of patients were confident they knew what to do if they thought they were having a heart attack [22]. However, only a small proportion of patients who had encountered the advertisements were influenced to call an ambulance. These

findings are consistent with a randomised controlled trial which found that patient's knowledge regarding an appropriate response to chest pain did not always translate into practice [23]. This suggests that there are important behavioural and psychosocial barriers that delay action. Such barriers include patients attributing symptoms to a less threatening cause, concerns about worrying or bothering others, embarrassment, denial and fear regarding the consequences of an AMI [1,4]. There was a greater proportion of males among patients who had not encountered the media campaign. The reason for this is not clear and it may be due to chance, as 84% of our cohort were male. It is also possible that male subjects had a lower exposure to the media campaign. The significance of this finding in our study is uncertain. There is some evidence that females may have more atypical symptoms of AMI and may delay seeking treatment [1,2]. However, a study from the US found no difference in delay between male and female AMI patients [3].

With regards to the impact of the NHF advertisements on pre-hospital time, we found that there was no significant difference in the median pre-hospital time in patients who had seen the NHF advertisements and those who had not. While this is a disappointing finding, it is consistent with previous research. The REACT Trial was conducted in 20 US cities (20,000 patients), 10 of which were targeted with a campaign which aimed to educate the public regarding appropriate actions following AMI symptom onset. Although there was evidence of increased public awareness of the program message, patient delays were identical in the intervention and reference communities [23]. Furthermore, a systematic review of 11 interventional studies aimed at reducing delays in AMI patients found that there is conflicting evidence that such interventions reduced delay [24]. Although the results of education campaigns in terms of hard outcomes have been disappointing, there is evidence that they have raised public awareness regarding AMI symptoms and treatment. We feel that further analysis and reflection on the results of such campaigns, as in this study, may lead to improvements in our knowledge and understanding in this complex field, and to more effective education campaigns in the future.

We believe our study has implications for further research and interventions in this area. Public education regarding AMI risk factors and symptoms may help patients recognise these symptoms and not underestimate their personal risk of an AMI. Addressing and removing psychological barriers such as embarrassment and fear in future campaigns may be beneficial in reducing delays. Prior research has shown that when patients tell those nearby about their symptoms, shorter treatment delays are experienced [6]. Therefore future campaigns may decide to target bystanders as well as patients.

Limitations

The sample size was limited, which may have decreased the validity of the results. Furthermore, the NHF media campaign ran for four years on a nationwide level, while this study was conducted over one year in the CCU of the

Canberra Hospital. Thus, the results of this study may not be an accurate representation of the overall effectiveness of the NHF media campaign. Furthermore, risk factor categorisation such as for diet and exercise, were loosely described and patients may have had differing perceptions on what constituted a healthy diet or exercise. Risk factors were based on patient reports as well as medical records and may not have been completely accurate. Furthermore, though the majority of patients stated that the NHF advertisements helped improve their understanding of AMI symptoms, it is not clear to what extent they understood and retained the information.

Conclusion

Most AMI patients do not realise that they are experiencing an AMI and do not call for an ambulance. There was no significant difference in the median pre-hospital time in patients who had encountered the NHF advertisements and those who had not. Patients were able to identify most of their risk factors, however, few were able to identify all their risk factors.

Further research is needed to determine the economic feasibility of providing universal ambulance cover for all Australians. Future studies also need to better identify psychological barriers to recognising AMI symptoms and calling an ambulance, allowing for the development of targeted interventions. Interventions are also required to further educate the public regarding important AMI risk factors, as this can not only give people a greater insight into their AMI risk, but also allow them to address such factors in order to minimise their risk.

Declaration of conflicts of interest

There are no conflicts of interest to declare.

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