Patient delay in responding to symptoms of possible heart attack: can we reduce time to care?

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Each year in Australia, there are more than 48 000 major coronary events, half of which are fatal.[1] Sudden cardiac death is usually due to ventricular fibrillation, which is eminently treatable with prompt cardiopulmonary resuscitation and defibrillation.[2] Coronary reperfusion with thrombolysis or angioplasty during the first 1–2 hours may reduce the death rate by half, but the benefit rapidly declines with delays in treatment.[3] Shortening the response time for suspected heart attack may substantially reduce the burden of cardiac damage and save many lives each year.

Since 1975, the National Heart Foundation of Australia has recognised the importance of early action for heart attack and has often promoted it as a theme for Heart Week. The promotions have been short term (1 week), limited in budget and conducted sporadically — with up to 10 years between promotions. There is no evidence that these campaigns have been effective in shortening response times for suspected heart attack.[4,5] We have reviewed the literature on pre-hospital delay by patients with suspected heart attack, and evaluated the strategies to promote appropriate responses to chest pain and symptoms of heart attack. We outline a comprehensive, ongoing campaign to promote early response to the warning signs of heart attack.

Delays in response to warning symptoms

Pre-hospital delay in response to possible heart attack symptoms is an international problem.[6] In a study in the United Kingdom, the median interval from symptom onset to hospital presentation was 2.2 hours.[7] In the United States, a study of 18 928 patients with acute myocardial infarction (AMI) found no change in patients' delay in presenting to hospital between 1987 and 2000, with nearly half taking more than 4 hours to reach hospital in 2000.[8]

Australian studies show a similar pattern. In one study of 317 AMI patients in the mid 1990s, the median pre-hospital delay was 6.4 hours.[9] In a 2005 report on patients with undifferentiated chest pain, the median pre-hospital time was 3.2 hours.[10]

Phases of delay

The interval between symptom onset and definitive treatment can be categorised into three phases (Box 1). The total time from symptom onset to definitive treatment comprises pre-hospital delay plus hospital delay (door-to-needle or door-to-balloon). Patient decision time constitutes most of the pre-hospital delay.[11]

Factors associated with patient delay

Failure to recognise a heart attack

A popular perception of a heart attack is of the victim experiencing sudden excruciating chest pain, clutching his or her chest, and collapsing.[12] People may not know that symptoms such as

ABSTRACT

- In Australia, many deaths and significant cardiac disability result from delayed response to symptoms of heart attack.

- Although delays due to transport and initiation of reperfusion therapy in hospital may contribute to late treatment, the major component of delay is the time patients take in deciding to seek help.

- A critical examination of campaigns to shorten patient delay concludes that they were based on a factual, short-term, non-targeted approach that included education and mass media strategies. They achieved equivocal results.

- One randomised controlled trial has been conducted. Although this showed an improved understanding of heart attack symptoms, it did not shorten pre-hospital delays.

- The implications of these findings are that future campaigns to shorten patient delay are likely to be more effective if they address the psychosocial and behavioural blocks to action, are ongoing rather than short term, and focus on people at highest risk, including those with known or high risk of coronary heart disease, those in rural locations, and Indigenous Australians.

- The National Heart Foundation of Australia proposes a comprehensive strategy to incorporate this approach into its future campaigns to reduce patient delay for suspected heart attack.

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dyspnoea, nausea or syncope may occur.[7] In a major US study, one-third of 434 877 subjects with confirmed myocardial infarction did not have chest pain on presentation to hospital.[13] The patients with atypical symptoms were older than those with chest pain and included a higher proportion of women and people with diabetes mellitus or prior heart failure. Women may see heart disease as a male problem and ignore their own symptoms.[14]

1 Phases of delay between symptom onset and definitive treatment		
Interval		**Definition**
Pre-hospital delay	Decision time or patient delay	Interval between onset of symptoms and the patient's decision to seek help
	Transport time	Interval between seeking help and arrival at the emergency department (ED)
Hospital delay	Hospital time	Interval between ED arrival and definitive treatment (door-to-needle time for thrombolytic therapy or door-to-balloon time for percutaneous coronary intervention) ◆

Failure to act despite almost certain knowledge that a heart attack is occurring

People with a history of coronary heart disease (CHD) may know more about the symptoms of heart attack, but surprisingly, do not seek help more promptly.[4,5] Analysis of the 1989 Heart Foundation campaign to improve patient response times concluded that "Experience is not a good teacher".[4] Reasons commonly proffered by survivors for failing to act include the risk of embarrassment, not wanting to bother others, and fear of what may happen if they report symptoms.[4-6]

Inappropriate general practitioner contact

Recent Australian studies have shown that people who seek advice from their GP when they experience chest pain take longer to reach hospital, with presentation to hospital delayed by nearly an hour.[15,16]

Indigenous status

Indigenous status is a factor in delayed response, but the reasons for this are not clear. In a small study in the Northern Territory, half of the Indigenous subjects reported "typical" chest pain, compared with three-quarters of the non-Indigenous patients. Furthermore, median delays from the onset of symptoms to emergency department (ED) presentation were longer for Indigenous than non-Indigenous patients, even for people in urban areas.[17]

Rural location

A study in Victorian hospitals found that patients treated in small rural towns had longer patient delays for reperfusion therapy than patients in metropolitan areas (median, 87 min v 57 min).[18] Similar rural–metropolitan differences have been reported in the NT.[17] It should be noted that the one-third of Australians who live outside capital cities have higher death rates from CHD.[19]

The observations from the literature on delays in presentation for threatened heart attack are summarised in Box 2.

Limitations of methodology in assessing reasons for delay

The literature on pre-hospital delay in response to symptoms of suspected heart attack is flawed. Studies have different inclusion criteria, with some including all patients who presented to EDs with chest pain[10,15] or those admitted to hospital with a suspicion of acute coronary syndromes,[20] while others included only those with confirmed AMI[10] or only those admitted to the intensive care unit or coronary care unit.[11] Many were cross-sectional surveys, drawn from only one or two hospitals[15,16] rather than population-based.[21] In some, data were collected prospectively (interviewing patients soon after their presentation), whereas others were based on retrospective chart review.[22] Many are limited by small sample size[7] or because of unreliable recollection of the history of events by patients. The most important limitation is that reports usually include information only about people who reach hospital alive. It has been estimated that about a quarter of people who have a heart attack die within an hour of their first-ever symptoms.[1]

Systematic review of the effectiveness of mass media campaigns on reducing chest pain response delay

To address the question "Are mass media campaigns effective in reducing patient delay in response to chest pain?", we searched the

2 Factors in delays, observations and implications for campaigns to shorten delay for presentation for threatened heart attack

Factors	Observations	Implications for campaigns
Failure to recognise a heart attack	Atypical symptoms occur in over a third of threatened heart attacks[7,11,13]	Education on symptoms of heart attack is required; campaigns should focus on promoting awareness of other symptoms of heart attack
Failure to act despite heart attack likely	Past history of CHD does not shorten response time[4,5,10,16]	Use psychosocial and behavioural approaches to educate patients with past history
Inappropriate contact with GP	Contact with GP rather than ambulance may result in delay by up to 1 hour[15,16]	Campaigns should encourage GPs and primary care staff to encourage and facilitate calling an ambulance
Indigenous status	Indigenous patients delay longer[17]	Efforts directed to Indigenous communities, health services and patients are required
Rural location	Rural patients delay 30 minutes longer than metropolitan residents[18,19]	Metropolitan messages need to be modified for rural areas

CHD = coronary heart disease. GP = general practitioner. ◆

following databases: Cochrane Systematic Reviews and Cochrane Controlled Trials Register (2004, Issue 1); MEDLINE 2004 (OVID and PubMed); EMBASE 1988–2004; PsycINFO 1897–2004; ERIC 1966–2004; CINAHL 1982–2004; plus all secondary references.[23] Inclusion criteria were: English-language article or abstract; and research article (ie, no letters, editorials, or narrative review articles). Excluded were articles about mass media campaigns for conditions other than heart disease or individual education programs for patients (even cardiac patients).

We reviewed 12 papers,[4,24-34] a Cochrane systematic review[35] and four non-English language papers (with English abstracts).[36-39]

Only one randomised controlled trial has tested the efficacy of mass media campaigns on reducing patient delay. The REACT study[33] was undertaken from 1995 to 1997 in 20 US cities (10 matched pairs). One city in each pair was randomly assigned to an 18-month intervention that targeted mass media, community organisations and professional, public and patient education to increase appropriate patient actions for AMI symptoms. The other city in each pair was assigned to reference status. During the study, 20 364 adults aged 30 years or older presented to hospital EDs with chest pain, met the criteria of suspected acute CHD on admission, and were discharged with a CHD-related diagnosis. There was a higher percentage of correct answers to questions about the appropriate action for AMI and greater appropriate use of emergency medical services in the intervention communities, but no difference in pre-hospital delay. The authors concluded that "new strategies are needed if delay time from symptom onset to hospital presentation is to be decreased further in patients with suspected AMI".[33]

A Cochrane review[35] addressed the effect of mass media interventions on health service use (not exclusively in response to chest

pain). It concluded that, although the primary research is relatively poor, mass media interventions do appear to have some effect on health service use. This review did not include the REACT trial.[33]

Twelve of the 16 studies compared chest pain response delay before and after a mass media campaign. However, only seven reported a statistically significant decrease in delay.[24,27-29,31,37,39] Three of four studies reported an increase in 911 calls,[31,38] and one found no difference.[32] Two reported an increased use of ambulances,[33,34] but others found no effect.[25,27,28,31] It appears that any effect these campaigns may have on ED presentations is not sustained.[28,30] One study[29] reported that there was no significant effect on the 1-year mortality rates for AMI patients admitted to a coronary care unit. Two studies[24,33] reported an increased awareness of the symptoms of AMI and knowledge of the appropriate actions to take in the event of chest pain; however, the REACT study found that a community's knowledge of appropriate response to chest pain did not necessarily translate into practice.[33]

Conclusions as to the effectiveness of mass media campaigns on reducing chest pain delay

It is difficult to compare these campaigns as they varied considerably in type and length, and in the time for follow-up of the effect. Most involved public exposure to the "message" using media sources, such as television, radio and print, but their duration ranged between 1 week and 18 months.[4,25,27]

The evidence that these campaigns reduce pre-hospital delay is unconvincing. As such, they should be considered only part of an overall systems approach to reducing the interval from onset of symptoms to revascularisation.[23]

The paradoxical finding that patients known to have ischaemic heart disease seek help no more promptly despite their frequent contact with doctors suggests that opportunities for educating patients are being wasted.

Implications for future campaigns

After review of the barriers to early action and the effectiveness of previous campaigns to shorten delay, the Heart Foundation's Chest Pain Every Minute Counts Working Group has reached a series of conclusions that will influence the design of future campaigns.

Short-term public message campaigns should be regarded as only part of an ongoing strategy

Short-term campaigns are unlikely to shorten patient delays in taking action for threatened heart attack, but provide opportunities to raise community knowledge of the symptoms of suspected heart attack and specify the action to be taken. For these reasons, they should not be discarded. The Heart Foundation has committed to an ongoing program where media will be used, as in Heart Week 2007, but only as part of an overall systems approach to advocating and promoting a reduction in patient response times.

High-risk groups should be targeted for intensive effort

Campaigns to target high-risk groups of people are more likely to be cost-effective, and provide opportunities to design targeted strategies to initiate early action in the event of suspected heart attack.[40] People known to have cardiovascular disease have five to seven times greater risk of AMI or death than the general population.[41] High-risk individuals with an absolute risk for a cardiovascular disease (CVD) event exceeding 15% over 5 years can be

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3 Heart Foundation action plan to shorten response time for suspected heart attack

Future Heart Foundation campaigns to shorten patient response time will have the following features:

Comprehensive and ongoing

The program needs to be comprehensive and ongoing rather than short term.[5,46] Some intensive periods of activity such as conducted during Heart Week 2007[49] are capable of increasing community awareness of heart attack and should continue.[4,33]

Emphasise recognition of heart attack symptoms

The fact-based component of the campaign should emphasise how to recognise the symptoms of a heart attack, including the less classical symptoms.[7,46]

Have a simple and clear plan for emergency action

All people at high risk should be given simple and clear advice on action to be followed in the event of a possible heart attack, emphasising the importance of calling an ambulance and getting to hospital as soon as possible; an outline of the plan for the general public is displayed on the Heart Foundation website.[49]

Directed to groups at highest risk of heart attack

Campaigns should target the highest risk groups — those with known coronary heart disease,[41] those with a high coronary risk profile,[42,43] those living in rural and remote areas,[44] and the Australian Indigenous population,[45] with action plans specific to their risk group.

Identify and overcome the behavioural and psychosocial barriers to early action

Action plans and education should address how to overcome the emotional, psychosocial and behavioural barriers that inhibit early action.[41,46] Because of the paradox that "experience is not a good teacher" in patients with known heart disease,[4] more research is needed to identify the motivators to trigger early action in the highest risk groups.[41,46] ◆

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identified from a basic analysis of their CVD risk factors.[42,43] People living in "remote" locations have a 10% higher risk of CHD death than residents of major cities, and those in "very remote" locations have a 30% higher risk.[44] Indigenous Australians are among the highest risk groups in the community and overall are three times more likely to suffer a coronary event than non-Indigenous people, while Indigenous people in the 25–44 years age group are eight times more likely. The case-fatality rate from the time of onset of a coronary event in an Indigenous person is 50% higher.[45]

However, the paradox that known heart disease does not guarantee appropriate action when symptoms occur in Australian patients[4,6] indicates that a deeper understanding of the barriers to action is needed.

Psychosocial barriers to action need to be overcome

Although "fact-based" campaigns have increased knowledge of heart attack in the community,[23,27,28,33,41,46] their inability to shorten delays in patient decision time indicates a pressing need to address the behavioural and psychosocial barriers that delay action.[46] The "self-regulatory model of illness behaviour"[47] has been suggested as a means of understanding how and when AMI patients decide to seek help and to guide the development of strategies to reduce delays. The model focuses on the cognitive and emotional processes that occur between when people first notice the symptoms and when they decide to call for help. It is suggested

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that seeking help may reflect the final attempt to gain control over the health threat presented by the symptoms, when other emotional-based coping strategies have failed.[48]

Strategies to reduce pre-hospital delay in people with AMI need to be broadened to include consideration of the social, cultural, cognitive, and emotional components that affect help-seeking behaviour.[46] The public message and creative treatment chosen for Heart Week 2007 focused on an emotional appeal to take action on symptoms based on this approach, and ongoing research is being conducted to focus the message for high-risk groups.

The Heart Foundation's action plan

The ongoing action plan proposed by the Heart Foundation is based on the above analyses and includes the features summarised in Box 3. Many of the conclusions that underpin this plan are similar to those recently reached in other countries.[40,41,46]

The engagement and collaboration of all health professionals and institutions involved in emergency care of heart attack victims is essential to ensure that efforts are coordinated.[41] This may require a chest pain workforce training strategy for health professionals and emergency response personnel, and collaboration with general practice organisations to ensure that procedures and policies are in place and familiar to all staff to reduce delay to the warning signs of heart attack.

Implementing and evaluating the plan

Implementation of this plan will require an inclusive approach of advocacy for policy change (providing adequate resources for emergency and hospital services), communication (defining clear messages to the public, high-risk groups and health professionals)

and education (introducing specific behavioural approaches to initiate appropriate action in targeted high-risk groups).

Because the provision of public information in isolation is insufficient to improve response times, an evaluation process is needed to assess the effect of this new comprehensive approach in achieving the improved response times it seeks. Previous short-term evaluations have provided invaluable information on Australian response times,[4,5,9,10] but the collection of information to monitor response times in a standardised national approach will require funding of dedicated research and collaboration of emergency services and hospital emergency departments. Experience in selected communities in the US shows that it is possible to collect meaningful data over longer periods,[8] and in Australia there has been substantial relevant experience in monitoring data on hospital door-to-needle and door-to-balloon times which can be used for the purpose of monitoring out-of-hospital delays.[18,50,51]

Conclusion

The reasons that patients delay in responding to symptoms of a suspected heart attack are complex and not well addressed in previous Australian and international short-term, fact-based campaigns. This has led the National Heart Foundation of Australia to recognise the complexity of the challenge to shorten response times and the need for a more effective approach. It has developed a detailed, evidence-based plan. To shorten response times effectively, a comprehensive ongoing effort is needed, focused on groups at the highest risk in the community, and directed to identifying and overcoming the psychosocial barriers to early action. The Heart Foundation's plan specifically recommends that patients with known CHD, people at high risk of CHD, people in rural and remote locations, and Aboriginal and Torres Strait Islander people have tailored efforts to overcome psychosocial barriers to early action, communicate the urgency and importance of early action, how to recognise suspected heart attack, and a specific action pathway. The success of this plan will require an intensive advocacy, communication and education effort, and the engagement of all health professionals and institutions involved in emergency management of suspected heart attack. Constant monitoring and research to ensure feedback and ongoing modification of the plan is essential. It needs to be well resourced, widely supported and modified as needed with an evidence-based approach.

It has the potential to save a large number of lives from heart attack each year.

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