

Extent of, and factors associated with, delay to hospital presentation in patients with acute coronary disease (the GRACE registry)

The primary objective of this report is to examine the extent of, and factors associated with, prehospital delay in an unselected population of patients hospitalized with AMI and UA using data from the large multinational observational GRACE study. A secondary objective is to examine the association between length of prehospital delay and timing and receipt of reperfusion strategies.

Results

This report is based on data from 10,582 patients with ACS in whom information was available about prehospital delay. Of these, 3693 patients had STEMI, 2935 NSTEMI, and 3954 UA. Delay times were highest in patients presenting with NSTEMI, followed by UA and finally STEMI. Over 40% of STEMI patients presented within 2 hours of the onset of symptoms compared to less than one-third with NSTEMI or UA (Figure 1). Between 23% and 32% presented to hospital at least 6 hours after the onset of symptoms.

Patients with STEMI benefit from coronary reperfusion strategies, and are more likely to receive these therapies if they present early after the onset of symptoms. In this study, three timepoints were selected to compare demographic, medical history and clinical characteristics associated with early versus late care-seeking behaviour: <2 hours, 2-5.9 hours, and ≥6 hours. In STEMI patients, younger age, male sex, history of coronary intervention, AMI or smoking, and patients with no medical history of angina, diabetes, stroke, heart failure or hypertension were significantly more likely to present for medical care within 2 hours of the onset of symptoms

than the other comparison groups. Arrival by ambulance, higher Killip class, diaphoresis, chest pain, symptoms developing in the early afternoon, and residency in the United States, New Zealand, Australia or Canada, were characteristics associated with early presentation. With the exception of age and medical history, similar trends were observed for patients with NSTEMI or UA.

Multivariate regression analysis controlling for demographic, clinical, and situational factors revealed that older age, history of heart failure, prior insulin therapy, shortness of breath, and residency in Europe and sites in Argentina/Brazil were significantly associated with delay to presentation in STEMI patients. By contrast, male sex, history of MI, Killip class IV, onset of symptoms in the afternoon, and arrival by ambulance were characteristics associated with early presentation. Somewhat similar but fewer factors were associated with prehospital delays over 2 hours in patients with NSTEMI or UA.

In STEMI patients, the length of prehospital delay was inversely proportional to the receipt of fibrinolytic therapy, with over 50% of patients who presented within 4 hours after the onset of symptoms receiving thrombolytic therapy compared with just over one-third who presented between 6 and 12 hours after symptom onset (Figure 2). No such association was observed for the use of PCI. In addition, while in hospital, progressive increases in the time to administration of thrombolytic therapy were observed with increasing length of prehospital delay. For

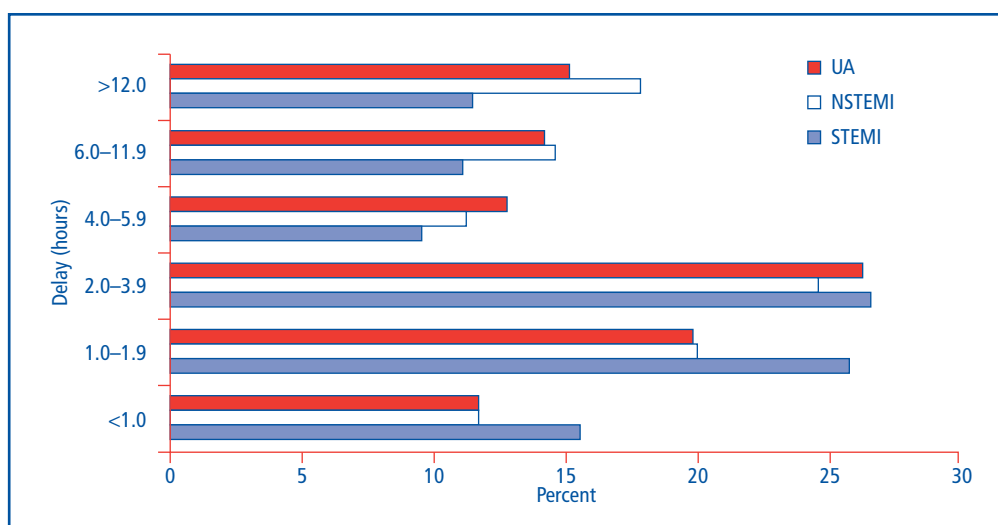


Figure 1.

Distribution of prehospital delay times in ACS patients. Adapted from R.G. Goldberg. Am J Cardiol 2002; 89: 791-6

R.J. Goldberg*, P.G. Steg, I. Sadiq,
C.B. Granger, E.A. Jackson,
A. Budaj, D. Brieger, Á. Avezum,
S.G. Goodman

*University of Massachusetts Medical School,
Worcester, MA

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example, in patients who presented within 2 hours, thrombolytic therapy was administered an average of 49 minutes after admittance to hospital, whereas in those who presented within 6 to 11.9 hours, thrombolytic therapy was given after an average of 86 minutes.

Discussion

The results of this study show that ACS patients delay seeking medical care after the onset of acute coronary symptoms. Patients with STEMI, who are the most likely to benefit from coronary reperfusion strategies, presented to hospital earlier than those with NSTEMI or UA. However, these patients also demonstrated some patterns of delay in seeking medical attention. The length of prehospital delay was also associated with the receipt and timing of use of fibrinolytic therapy, with increasing hospital delay in administering fibrinolytic therapy in patients who presented later after the onset of symptoms. Between one-quarter and one-third of patients presented to hospital 6 hours or more after the onset of symptoms, significantly reducing their likelihood of receiving fibrinolytic therapy, the efficacy of which is linked to the speed of administration.

A variety of factors, including sociodemographic, behavioral, clinical and contextual characteristics, have been examined in association with length of prehospital delay after the onset of acute coronary symptoms.^{1,2} The findings from this study lend support to the literature, which demonstrates that older age is associated with longer prehospital delay,³⁻⁶ and may be related to limited access to medical care, negative experiences of hospital treatment, or inability to recognize the symptoms.

Patients treated with insulin showed longer prehospital delays than those not receiving this therapy. The reasons for this may be altered pain perception, non-specific symptoms, or denial. Similarly, patients with a history of heart failure, who have received counseling on the importance of seeking early medical attention for acute ischemic symptoms, also presented to hospital later than those without a history. By contrast, male sex, history of MI, symptom onset in the afternoon, diaphoresis,

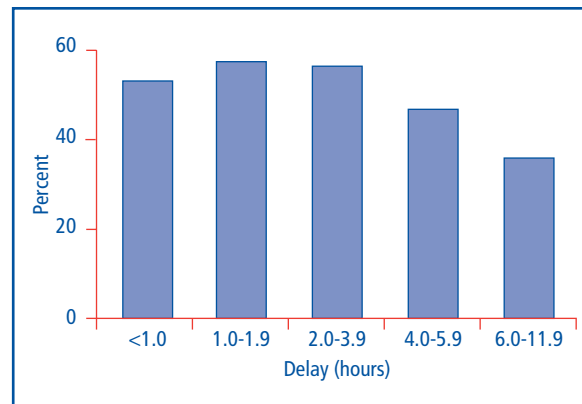


Figure 2.

Duration of prehospital delay and administration of fibrinolytic therapy (STEMI patients).

Adapted from R.G. Goldberg. Am J Cardiol 2002; 89: 791–6

cardiogenic shock, and arrival by ambulance were characteristics associated with earlier presentation to hospital. This early care-seeking behavior may be due to the fact that these patients are likely to be sicker than other respective comparison groups.

Other factors associated with prolonged delay to hospital presentation included shortness of breath, the seriousness of which may be misinterpreted by the patient, and residence in Europe or Argentina or Brazil. Geographic differences may be related to unmeasured factors or cultural or medical care practices.

In contrast to the use of fibrinolytic therapy, duration of prehospital delay was not associated with the use of PCI. This may be because the results from randomized clinical trials involving primary PTCA, in which the majority of patients presented within 12-24 hours of the onset of acute symptoms, demonstrated no relationship between timing of PTCA and magnitude of benefit.

The findings from this study highlight the need for improved education of the general public about the importance of seeking medical attention early after the onset of acute ischemic symptoms.

References

1. Dracup K, Moser DK, Eisenberg M, Meischke H, Alonzo AA, Braslow A. Causes of delay in seeking treatment for heart attack symptoms. *Soc Sci Med* 1995; 40: 379–92.
2. LaRosa JH, Horan MJ, Passamani ED, eds. Proceedings of the National Heart, Lung and Blood Institute Symposium on Rapid Identification and Treatment of Acute Myocardial Infarction: Issues and Answers. Rockville, Md. National Heart, Lung and Blood Institute. National Institutes of Health, US Dept. of Health & Human Services; 1991: 1–157.
3. Yarzebski J, Goldberg RJ, Gore JM, Alpert JS. Temporal trends and factors associated with extent of delay to hospital arrival in patients with acute myocardial infarction: The Worcester Heart Attack Study. *Am Heart J* 1994; 128: 255–63.
4. Goldberg RJ, Yarzebski JL, Lessard DM, Gore JM. Decade long trends (1986–1997), and factors associated with, time to hospital presentation in patients with acute myocardial infarction (The Worcester Heart Attack Study). *Arch Intern Med* 2000; 160: 3217–23.
5. Turi ZG, Stone PH, Muller JE, Parker C, Rude RE, Raabe DE, Jaffe AS, Hartwell TD, Robertson TL, Braunwald E, and the MILIS Study Group. Implications for acute intervention related to time of hospital arrival in acute myocardial infarction. *Am J Cardiol* 1986; 58: 203–9.
6. Rawles JM, Haites NE. Patient and general practitioner delays in acute myocardial infarction. *Br Med J* 1988; 296: 882–4.