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ORIGINAL ARTICLE

The Effect of Presenting Symptoms and Patient Characteristics on Prehospital Delay in MI Patients Presenting to Emergency Department by Ambulance: A Cohort Study

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Introduction There is little recent information about prehospital delay time for Australian patients with myocardial infarction (MI).

Objectives This study: (1) describes prehospital delay time for patients with MI; (2) identifies variables and presenting symptoms which contribute to the delay.

Methods This retrospective cohort study identified patients with an Emergency Department (ED) discharge diagnosis of MI, transported by ambulance to one of the seven Perth metropolitan EDs, between January 2008 and October 2009. Prehospital delay times were analysed using linear regression models. Non-numeric (word descriptions) of delay time were categorised.

Results Of 1,633 patients, symptom onset-time was available for 1,003. For 829 patients with a numeric onset-time, median delay was 2.2 hours; decreased delay was associated with age <70 years, presenting with chest pain, and diaphoresis. Increased delay was associated with being with a primary health care provider, and if the patient was at home and if the person who called the ambulance was anyone other than the spouse. For 174 patients with non-numeric onset-times, 37% patients delayed one to three days and 110 (64.0%) patients described their symptoms as intermittent and/or of gradual onset.

Conclusion Given that prehospital delay times remain longer than is optimal, public awareness of MI symptoms should be enhanced in order to decrease prehospital delay.

Keywords Myocardial infarction • Prehospital delay • Symptom presentation • Emergency Department • Emergency medical service

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Introduction

Over 49,000 patients per year have a myocardial infarction (MI) in Australia - about 135 per day - and nearly 40% of these events are fatal [1]. Reperfusion therapy of an obstructed coronary artery decreases myocardial damage and is vital in decreasing mortality and morbidity; however, this intervention is time-critical and delays decrease its efficacy [2,3].

There has been considerable success in decreasing hospital delay times for MI patients (i.e. door-to-treatment) [4], but reducing prehospital delay, i.e. the total amount of time taken by patients to present at the Emergency Department (ED) following acute symptom onset, has been less successful [5,6]. The main cause of prehospital delay is the time taken for the patient to decide that their symptoms need medical attention (patient decision time). Australian studies [5,7–15] on prehospital delay report median prehospital delays of 1.2 to 6.4 hours. Internationally, overall duration of prehospital delay has remained relatively unchanged over the last two decades [5,6,16], and public educational campaigns [7,17] and targeted education and counselling [17,18] have had little success in reducing prehospital delay.

Identification of variables associated with prehospital delay may lead to interventions that succeed in shortening delay time. With the exception of increased delay time associated with contacting a primary health care provider (HCP) [6,19,20] and being alone or at home [6,21] at symptom onset, consistent factors that influence delay have not emerged. There is an abundance of research focussing on prehospital delay but, of the six studies [9,19–23] that have investigated the effect of MI symptoms on delay time, only one [9] from 1995 specifically investigates Australian patients with MI, so an update is timely. The aims of this study were to: (1) describe prehospital delay time in Western Australian patients with an ED discharge diagnosis of MI who were transported by ambulance; and (2) identify patient characteristics and presenting symptoms of MI which contribute to this delay.

Methods

Study Design, Setting and Participants

A secondary analysis was performed on data originally collected for a study that examined sex differences in symptoms of MI reported to ambulance dispatch [24]. This retrospective cohort study reviewed prospectively collected paramedic patient care records (PCRs) and the emergency telephone calls of all adult patients with an ED discharge diagnosis of MI transported by St John Ambulance Western Australia (SJA-WA) to one of the seven Perth metropolitan public EDs between January 1, 2008 and October 31, 2009. The Perth metropolitan area is over 5000 square kilometres and has a population of 2.3 million [25]. SJA-WA is the single provider of emergency road ambulance for WA and is staffed by paramedics. Ethical approval was obtained for this study from The University of Western Australia (RA/4/1/2428).

Data Sources

Two databases were linked: the Emergency Department Information System [26] (EDIS) and the SJA-WA database. EDIS, an ED patient-tracking system containing patient demographic and disposition data, was used to identify all adult patients with an ED discharge diagnosis of MI during the study period. The SJA-WA patient database contains records of all cases attended by ambulances in WA and the paper-based, paramedic-completed PCRs. Data from the emergency phone-call to SJA-WA was retrieved and transcribed. Data collected included patient characteristics, time variables and symptoms on presentation.

Symptoms reported on presentation and symptom onset-times were extracted from the paramedics' PCRs. If the onset-time was not available from the paramedic's PCR, the emergency phone-call transcript was searched. Presenting symptoms of MI included: chest pain; left arm; right arm; jaw, throat and neck pain; diaphoresis; shortness of breath; abdominal or epigastric pain; nausea; vomiting; syncope, collapse or unconscious; dizziness; weakness; fatigue; back pain; and a fall. Chest pain was operationally defined to include right-sided, left-sided, and central chest pain, chest tightness, and chest heaviness. Individual patients could experience multiple symptoms. Additional information pertaining to the emergency phone-call was collected, including the day of the week (weekday or weekend), time of the day (0600-1159, 1200-1759, 1800-2359, 000-0559), the relationship of the caller to the patient and the patient's location. 'Other location' included sporting venues, shopping centres, hotels, education centres, and the side of the road. Hospital arrival time was obtained from the EDIS.

Data Analysis

For patients with numeric symptom onset-times (e.g. 1-Jan 2008 15:30), prehospital delay time was calculated by subtracting their ED arrival time from their symptom onset-time. As delay times were skewed, they were described using medians and interquartile ranges (IQR) and log transformed for further analyses. Each variable was initially tested for association with delay time in a univariable linear regression model. Multivariable linear regression was used to determine variables independently associated with prehospital delay time. The initial multivariable model, which included the variables listed in Table 1, was simplified in a stepwise fashion by removing the variable with the least significant p-value and refitting the model until only variables with p-values <0.10 were retained. As a final check, all excluded variables were retested one at a time in the final multivariable model. Exponential beta coefficients [exp(B)] and 95% confidence intervals (CIs) were reported. These values correspond to changes in the ratio of the expected geometric means of the original delay time. Data were analysed using SPSS version 22 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 22.0 Armonk, NY: IBM Corp) and significance was set at 0.05.

Non-numeric symptom onset-times (e.g. yesterday, three days ago, last week), were categorised by two members of