Patients' knowledge about symptoms and adequate behaviour during acute myocardial infarction and its impact on delay time
Findings from the multicentre MEDEA Study

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ABSTRACT

Objective: We aimed to assess whether patients' knowledge about acute myocardial infarction (AMI) has an impact on the prehospital delay-time.
Methods: This investigation was based on 486 AMI patients who participated in the cross-sectional Munich-Examination-of-Delay-in-Patients-Experiencing-Acute-Myocardial-Infarction (MEDEA) study. A modified German-version of the ACS-Response-Index Questionnaire was used. Multivariate logistic-regression models were used to identify factors associated with knowledge-level as well as the impact of knowledge-level on delay-time.
Results: High AMI-knowledge shortened median delay-time in men (168[92–509] vs. 276[117–1519] mins, $p = 0.0069$), and in women (189[101–601] vs. 262[107–951]mins, $p = 0.34$). Almost half-of-patients (n = 284,58%) demonstrated high AMI-knowledge. High-knowledge were independently associated with male-gender ($OR = 1.47[1.17–1.85]$) and General-Practitioner as a knowledge-source ($OR = 1.42[1.14–1.77]$). Old-age ($OR = 0.87[0.86–0.89]$) and previous AMI-history/stent-placement ($OR = 0.65[0.46–0.93]$) were significantly associated with lower-knowledge. Although the majority (476,98%) correctly recognized at least one AMI-symptom, 69(14.2%) patients correctly identified all AMI-symptoms. Additionally, one-in-three believed that heart-attack is always accompanied with severe chest-pain. Elderly-patients and women were more likely to be less-knowledgeable about atypical-symptoms ($p = 0.006$), present with atypical AMI-presentation ($p < 0.001$) and subsequently experience protracted delay-times ($p < 0.001$).
Conclusions: Knowledge of AMI-symptoms remains to be substandard, especially knowledge of atypical-symptoms. Knowledge is essential to reduce delay-times, but it is not a panacea, since it is not sufficient alone to optimize prehospital delay-times.

1. Introduction

Time is critical in the management of an acute coronary syndrome, as longer delay from the symptoms-onset to reperfusion has been linked to increased mortality and worse clinical outcomes [1,2]. It is estimated that every additional 30 min of reperfusion delay increases 1-year mortality by 8% [3]. Significant improvements have been achieved during the last decades in shortening of the in-hospital and system delay [4]. However, little has been gained in the pre-hospital delay times, with patient decision delay remaining the largest portion of the total delay and thus encompassing a major unresolved public health problem [5,6]. Potential reasons for the patient decision delay may be a lack of knowledge regarding the typical and atypical presentation of acute myocardial infarction (AMI) as well as the appropriate reaction to these symptoms.

Considerable interests and efforts have been invested in strategies to improve prehospital delay times. For instance, many

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public health campaigns have been undertaken in the hope that providing individuals with knowledge about AMI will improve the timely access to medical services during acute event. However, they often ended up with disappointing results despite an increase of AMI-knowledge in the population through extensive community education programmes [7,8]. Therefore, it is still questionable whether patients' knowledge has an actual impact on their behaviour and reaction during the acute event.

Indeed, there is a considerable room for improving patients' knowledge about AMI [9–11]. While knowledge on typical symptoms such as chest pain might have improved over years, knowledge of atypical symptoms is less evident [11–14]. Nevertheless and surprisingly, there is no clear evidence that educating patients on AMI-related symptoms actually improves their knowledge, enables them to quickly make decision during acute event and ultimately reduce the prehospital delay time. While some studies reported beneficial impact of knowledge on delay time [15,16], others failed to find a significant difference with regards to the effects of knowledge [7,17,18]. Thus, it is important to determine the patients' characteristics associated with inadequate knowledge, in particular knowledge of atypical symptoms, in order to identify those patients in clinical practice who may need extra attention by clinicians and to facilitate the development of appropriate targeted information and educational interventions as well.

The aim of the present investigation, therefore, was to describe the level of knowledge about AMI in patients with documented STEMI, to identify the patients' characteristics associated with inadequate knowledge and to assess the impact of patients' knowledge about AMI on prehospital delay.

2. Methods

The multicentre, cross-sectional MEDEA study (Munich Examination of Delay in Patients Experiencing Acute Myocardial Infarction) was conceived with the aim to document the prehospital delay of patients with ST-elevation Myocardial Infarction (STEMI), and the factors which may contribute to prolonged delay.

2.1. Study design

The patients were recruited from eight different university or municipal hospitals with coronary care units, belonging to the Munich emergency system network clinics. The MEDEA study was approved by the Ethic Commission of the Faculty of Medicine of the Technischen Universität München (TUM). The main inclusion criterion was diagnosis of STEMI as evidenced by typical clinical symptoms, ECG changes and myocardial biomarkers levels. Exclusion criteria were: in-hospital STEMI, resuscitation at AMI-onset and language barriers or cognitive impairment impeding patients to answer the questionnaires properly. There were no age restrictions.

Standardized operation procedures (SOPs) were implemented to ensure the consecutive referral of eligible patients into the study. All patients were informed of the aim and procedures of the study and also that taking part in the study would have no effect on their treatment. All patients were required to sign a declaration of consent. Details about study design, sampling method and data collection are reported elsewhere [19].

2.2. Sample

From 12.12.2007 until 31.05.2012, 755 patients had a diagnosis of STEMI, data on 619 patients were collected. Approximately 18% of patients (n = 136) were excluded due to not meeting inclusion

criteria (4%) and due to absence of consent (14%). There were few dropouts in the study since physicians did not inform MEDEA study personnel of AMI patients who were unable to answer the study questionnaire due to their critical condition (e.g. coma).

For the present analysis, 486 patients were included since 133 patients with missing values on knowledge score were excluded. Drop-out analysis revealed no significant difference in age, sex, sociodemographic, clinical and other relevant covariates. However, included patient were more likely to have a high-education level and being employed.

2.3. Data collection

The data collection process was divided into three sections. Firstly, a bedside structured interview was conducted with trained personnel. Secondly, a self-administered questionnaire was filled by the patient without supervision. Thirdly, data were collected from the hospitals' patient charts.

2.4. Measures

2.4.1. Knowledge score

Knowledge of AMI symptoms was measured using a modified German version of the ACS Response Index Questionnaire [20], which was reviewed by experienced cardiologists as well as patients' representatives. It is an 18-item instrument reflecting two main components. (1) Knowledge of AMI symptoms subscale: from a list of 13 predefined symptoms (8 were correct and 5 were distractor), patients were asked to correctly identify symptoms that could be a representative of AMI. (2) Knowledge of appropriate behaviour subscale: patients were also asked to respond to additional five statements related to the appropriate behaviour during AMI. This instrument was self-administered. The total knowledge score was 18, and for analysis purposes the score was dichotomized by the median (Low: <14, High: ≥14). (See Table S1).

2.4.2. Pre-hospital delay (PHD)

Patients were asked to recall at what time acute symptoms began. The time difference between symptom-onset and first ECG in the clinic constitutes "prehospital delay" (PHD), measured in minutes. PHD was thus available as a continuous variable which was heavily left-skewed. PHD did not approximate a normal-distribution after transformations and, therefore, was further dichotomized into 2 groups: <120, and ≥120 min.

2.4.3. Baseline, clinical and behavioural measures

The hospital patient charts and bedside patient-interviews provided data on metabolic risk factors and presenting symptoms. Educational level was defined as low (who have not completed 12 years of basic education) and high (completed 12 years or more of basic education). Prodromal symptoms were defined by the presence of any of the symptoms related to CAD. Additionally, patients were asked about the sources of their information about AMI: family doctor (GP), friends, media or public campaigns by the heart foundation. Information about the chosen mode of transportation to hospital and whether the patient called the emergency services (as a first reaction) were also collected.

The structured bedside interview included a documentation of subjective risk perception (1 item, 5-point Likert-scale) and symptom expectation ('how much were the symptoms experienced comparable with the symptoms that you would have expected from a heart attack', 5-point Likert-scale). Dichotomized measures of risk perception (≤3 vs >3) and symptom expectation (≤3 vs >3) were used.