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Original Research Article

Assessment of coronary care management and hospital mortality from ST-segment elevation myocardial infarction in the Kazakhstan population: Data from 2012 to 2015

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ABSTRACT

Objective: The aim of this study was to assess and evaluate factors related to coronary care management and hospital mortality in patients with ST-segment elevation myocardial infarction (STEMI) hospitalized in the Kazakhstan County and city hospitals in which percutaneous coronary intervention (PCI) was performed during the period of 2012–2015.
Materials and methods: A total of 22,176 adult patients (18> years) with acute STEMI were hospitalized from January 2012 to December 2015. All the investigated STEMI patients underwent PCI.
Results: The mean age of STEMI patients was 61.52 ± 11.48 years, 72.2% of the patients were male and 75.2% living in the rural regions. The mean time from hospitalization to PCI was 2104.41 ± 5060.68 min (median 95.0 and IQR 1034.5). The mean and median of time from hospitalization to PCI tended to decrease from 2747.7 ± 5793.9 min and 155.0 min in 2012 to 1874.7 ± 4759.2 min and 73.5 min in 2015. Among all STEMI events the percentage of patients from hospitalization to PCI within 0–59 min was up to 39.0% during all study period. From 2012 to 2015, the percentage of STEMI patients with short time (0–59 min) of hospitalization to PCI tended to increase in average by 11.4% per year ($P = 0.09$). Among all STEMI patients hospital mortality from 2012 to 2015 did not change significantly and ranged from 9.0% in 2012 to 8.6% in 2015. By multiple logistic regression analysis, study years (2012), gender (female), age (60> years), time from hospitalization to PCI (60> min) and number of bed-days were statistically significant factors associated with patients' hospital mortality from STEMI with PCI.
Conclusions: The present study demonstrated that hospitalization delay in the treatment of STEMI patients in Kazakhstan population was without significant changes, meanwhile the number of patients perfused within 1 h from hospitalization to PCI tended to increase during

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2012–2015. The higher hospital mortality was associated with study year, female gender, older age, longer-time from hospitalization to PCI and shorter hospitalization.

1. Introduction

Despite the improvement of coronary care and the decline in mortality due to acute ST-segment elevation myocardial infarction (STEMI) in recent years, STEMI remains one of the most fatal diseases in the Kazakhstan population, the same as in other Western and Eastern developed and developing countries [1–5]. Timely reperfusion of the infarct-related artery is the cornerstone of treatment for stopping the progression of myocardium necrosis [6,7]. The outcomes of reperfusion therapy are dependent on the ischemic time from the onset of symptoms to the treatment [8,9]. The strategy of coronary care management involves integrated efforts to shorten the time from the onset of symptoms to hospitalization, to increase the patients' knowledge about ischemic heart disease symptoms, and shorten the time from hospitalization to percutaneous coronary intervention (PCI) and hospital coronary care. The efforts to implement quick myocardial reperfusion as recommended in clinical guidelines have resulted in significant curtailment of hospital time delay to treatment and have improved clinical outcomes [10–12]. In recent population studies, there is little information about the peculiarities of hospital coronary care management and trends in treatment of patients with STEMI and their relevance to hospital mortality. Prehospital and hospital time delay in patients with STEMI has been found to be an important factor of hospital mortality [13–15]. The major factors associated with the peculiarities of hospital coronary care management have not been clearly identified in the Kazakh population with STEMI.

The aim of this study was to assess and evaluate some aspects related to coronary care management and relationship to hospital mortality in patients with STEMI hospitalized in the Kazakhstan County and city hospitals as well as subjected to PCI from 2012 to 2015.

2. Materials and methods

2.1. Study design and subjects

The data on adult patients (18> years) who presented with acute STEMI to the Kazakhstan County and city hospitals from January 2012 to December 2015 were gathered and used for analysis. The data were available from 14 Kazakhstan Counties and 2 cities (Almaty and Astana). During this time, a total of 22,176 consecutive patients were hospitalized.

2.2. Data collection

Sociodemographic factors and other clinical and coronary care management characteristics were extracted from the Kazakhstan Diseases Registration Center Database. Cases without STEMI and PCI were excluded from this study.

Clinical as well as coronary care management variables were investigated with regard to gender, age, location of living and time from hospitalization to percutaneous coronary intervention (PCI), bed-days, myocardial infarction recurrent events and hospital mortality data. Patients were divided into two groups according to the time from hospitalization to PCI (0–59 min and 60> min) [16]. Data on hospital mortality were available from the Kazakhstan Disease Registration Center Database. Data about transportation from the moment of STEMI event to the hospitals were not available. PCI procedures were done in the intensive cardiology care departments at the Kazakhstan PCI-capable hospitals. Up to year 2013 STEMI system in Kazakhstan hospitals was not in accordance with ACCF/AHA and ECS Guidelines algorithm of acute coronary syndrome with ST elevation treatment, but from year 2013 acute coronary syndrome with ST elevation treatment algorithm (Protocol No. 1 of Expert Council at Kazakhstan Republic Health Ministry at 28 06 2013) and 2013 ACCF/AHA, ECS Guidelines for the Management of STEMI were used [17,18].

2.3. Definitions

All STEMI patients with codes I21.0-3 and I22.0-3 according to International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) were analyzed. STEMI was defined according to the criteria of the universal definition of myocardial infarction [19]. The definition of the STEMI diagnosis: (1) ST-segment elevation consistent with MI of ≥2 mm in adjacent chest leads and/or ST-segment elevation of ≥1 mm in 2 or more standard leads or new left bundle branch block, and (2) positive cardiac necrosis markers. Time from hospitalization to PCI was the time from patient's arrival in the emergency department of hospitals to PCI. The term ‘‘bed-days’’ means the days of staying in the hospital from arrival to discharge. The term of hospital mortality (case fatality) defined the patients who died in hospital due to STEMI. The fatal cases were compared with all the cases of hospitalized patients due to STEMI during study period.

2.4. Statistical analysis

Kolmogorov–Smirnov test was used to test normality of continuous data distribution. The numeric variables were summarized by their mean, 95% confidence interval (CI), median and interquartile range (IQR); categorical variables by counts and relative frequencies. Differences in patients' sociodemographic status and some clinical characteristics were compared between subgroups with chi-square test for categorical variables and Student t test for continuous

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