Present treatment of acute myocardial infarction in patients over 75 years

Data from the Berlin Myocardial Infarction Registry (BHIR)

Summary Aims Guidelines issued by European and German cardiology societies clearly define procedures for treatment of acute myocardial infarction (AMI). These guidelines, however, are based on clinical studies in which older patients are underrepresented. Older patients, on the other hand, represent a large and growing portion of the infarction population. It was our goal in the present paper to analyse the present treatment of AMI patients over 75 years of age in the city of Berlin, Germany, with data gained from the Berlin Myocardial Infarction Registry (BHIR). Methods We prospectively collected data from 5079 patients (3311 men and 1768 women, mean age 65.6) with acute myocardial infarction who were treated in 25 hospitals in Berlin during the period 1999–2003. 1319 patients (25.9%) were older than 75 (mean age 82.5 years). Results Overall hospital mortality rate was 11.6%. In patients over 75, this rate was 23.9%; among the younger infarction population, it was 7.3%. In contrast to the younger AMI patients, the majority of those over 75 were female (62.5 vs 25.1% for the younger) and demonstrated a significantly higher frequency of all prognostically meaningful comorbidities (heart failure 14.4% vs. 3.5%; renal failure 11.5 vs 3.9%; diabetes 37.3 vs 24.3%). Clinical signs of severe infarction, moreover, were more common among the aged patients (pulmonary congestion 45.4 vs 19.7%; left bundle branch block 12.7 vs 3.6%). Pre-hospital time was prolonged (2.8 vs 2 h) and guideline-recommended therapy was applied significantly less frequently to AMI patients over 75 (reperfusion therapy 39.8 vs 71.7%, beta-blockers 62.8 vs 78.3%, statins 26.5 vs 45.5%). Multivariate analysis revealed the following factors to be independent predictors of hospital mortality in patients over 75: age (OR 1.05 per year), acute heart failure (OR 2.39), pre-hospital resuscitation (OR 10.6), cardiogenic shock (OR 2.73), pre-hospital delay >12 h (OR 1.68), and ST elevation in the first ECG (OR 2.09). Independent predictors of a favourable hospital course were as follows: admission to a hospital >600 beds (OR 0.64), reperfusion therapy (OR 0.63), early beta-blocker treatment (OR 0.46), and early application of ACE inhibitors (OR 0.48). Conclusion Infarction patients over 75 have a very high hospital complication and mortality rate. They are typically treated with delay, and with less adherence to relevant guidelines than are younger patients. Reperfusion therapy, early administra-
intervention of beta-blockers and ACE inhibitors, as well as admission to large medical centres are all factors that contribute to a favourable prognosis of high-aged AMI patients.

**Key words** Acute myocardial infarction – registry – age – hospital mortality

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**Introduction**

At present, 3.8% of the German population is 80 or more years of age. The German Federal Bureau of Statistics estimates an increase in this percentage up to 12% over the next 50 years [1]. The German public health system must cope with the development that approximately 9 million Germans will be octogenarians or nonagenarians in 2050. Almost all Western industrialized countries expect similar demographic developments.

Approximately one third (24 to 42%) of the patients in the European infarction registries are 75 or older [2]. Owing to present dramatic demographic developments, this share will increase continuously in the near future. Data from long-term infarction registries already indicate an increase in the number of older patients and in mean ages over the last decade [3]. It is estimated that in 2050 up to two-thirds of the German infarction victims will be over 75 years of age. This development will likewise double the number of infarctions suffered.

Unfortunately, older patients have in the past been excluded from prospective randomized infarction treatment studies, or they have been underrepresented in study populations (<10%) [4]. As a result, our knowledge of the special characteristics of acute myocardial infarction in older age is based on only a small number of randomized studies and register data [5–8]. AMI guidelines [9], moreover, cover this important sub-population only to some extent.

On the basis of the data of the Berlin Myocardial Infarction Registry (BHIR), our objective is to demonstrate how acute myocardial infarction at greater age is presently treated in a major European city. We furthermore intend to identify trends during recent years, and to find indicators for the efficacy of guideline-recommended treatment in patients older than 75.

**Methods**

**Berlin Myocardial Infarction Registry (BHIR)**

The BHIR was established in 1999 to collect data on the treatment and the outcome of patients in Berlin with acute myocardial infarction. A total of 25 (of 36 possible) hospitals participated in this prospective study for at least 1 year. Ten hospitals participated throughout the whole study period (5 years). Our analysis includes data from 20 hospitals in which study monitors found complete data sets.

The participating institutions include community, tertiary-care, and university hospitals. We estimate that approximately two-thirds of all patients with AMI in Berlin were treated in one of the study sites. Thirteen of these hospitals have facilities for left-heart catheterization, and all are equipped with an intensive care unit. Eight hospitals have more than 600 beds, 6 have 400–600 beds, and 6 fewer than 400 beds.

Participating centres were regularly informed of the progress of ongoing data analysis, and were accordingly able to compare their own results with those from other centres.

**Patients**

The registry includes patients with acute myocardial infarction (AMI) who were admitted within 48 hours of symptom onset, and who were treated in an intensive care unit (ICU). To avoid double registration, all patients were excluded who were transferred from other hospitals (e.g., for cardiac catheterization). AMI patients who died before hospital admission and patients who were not treated in an ICU for any reason were not registered.

**Definitions**

AMI was diagnosed as unambiguous upon satisfaction of two out of the following three criteria: typical chest pain, typical ECG signs (ST elevation, LBBB), and significant increase in myocardial serum markers (CK, CKMB). Cardiogenic shock was defined as systolic blood pressure below 100 mmHg and heart rate over 100/min. Contraindications for thrombolytic therapy were chest pain lasting longer than 12 hours, present gastric ulcers or clinical signs of active bleeding (e.g., melena), stroke within the previous 3 weeks, or surgical procedures within the previous 2 weeks.