Factors associated with in-hospital death from myocardial infarction

Recent evidence suggests that improvements in survival among patients hospitalized with acute myocardial infarction have accelerated over the past decade. Naylor and Chen reported a fall in the age and gender-standardized in-hospital case fatality rate in Ontario, Canada from 22% in 1981 to 16% in 1991, with almost all of this decline occurring after 1985[1]. Similarly, in France, a substantial reduction in in-hospital fatality rate was seen in men (from 21% in 1985 to 11% in 1990)[2]. Among men in the Minnesota Heart Survey, the 41% decline in in-hospital mortality from coronary heart disease between 1985 and 1990, exceeded the 17% decline in out-of-hospital coronary heart disease mortality[3].

Widdershoven, et al.[4] report in this issue a study comparing case fatality rates in patients with myocardial infarction admitted to a single hospital in the Netherlands in 1982, 1988 and 1994. The in-hospital case fatality rate fell significantly from 17-0% in 1982 to 10-1% in 1988 and 9-4% in 1994. Morbidity prior to discharge was also less severe in 1988 and 1994 than in 1982. Given the recent introduction of treatments for myocardial infarction proven to be effective in randomized controlled trials, it is tempting to attribute observed improvements in survival to changes in medical care. Indeed, in this study the uptake of aspirin, beta-blockers, calcium antagonists and angiotensin converting inhibitors was higher in 1988 and 1994 than in 1982. Furthermore, the proportion of patients receiving thrombolytic therapy rose from 1% in 1982, to 27% and 29% in 1988 and 1994, respectively. There was a significant increase in the percentage of patients with a previous history of percutaneous transluminal coronary angioplasty or coronary artery bypass grafting. Patients who had not received thrombolytic therapy or who had no history of percutaneous transluminal coronary angioplasty or coronary artery bypass grafting, were more likely to die in hospital in both 1988 and 1994. While medical interventions have undoubtedly had an impact on case fatality in patients hospitalized with myocardial infarction, the authors are correct in highlighting other factors that may be playing a role.

Patients admitted in 1994 were significantly older than those hospitalized in previous years. Age is a well-recognized predictor of case fatality, and it is therefore possible that a greater relative decline in in-hospital death rate in 1994 might have been demonstrated had the authors reported age-standardized case-fatality rates rather than crude rates. On average, fatal cases were about 10 years older than non-fatal cases in all three years. It is not clear why age was found, in multivariate analysis, to be independently related to outcome in 1982 but not in subsequent years.

The preponderance of women in 1994 probably reflects the higher mean age of the patient sample in that year. The contribution of gender to outcome in myocardial infarction is a matter of controversy. While some studies suggest a poorer prognosis in women, others have found no difference between the sexes after adjusting for age and other prognostic indicators[5,6]. Female sex was found to be independently related to in-hospital fatality in this study, only in 1994.

Although the prevalence of smoking in 1988 and 1994 (48%) was lower than in 1982 (61%), the percentage of smokers was higher among survivors than among fatalities in all three years. The authors suggest that the better outcome in smokers may be due to 'a more severe course (of disease) in non-smoking individuals'. This explanation is implausible. Cigarette smoking is a known risk factor for sudden death[7], therefore the lower proportion of smokers among those who experience coronary death in hospital probably reflects a higher rate of out-of-hospital death in this group. The higher rate of smoking associated with survival may also be due to confounding or chance. Smoking did not emerge as an independent predictor of death in the multivariate analysis. Markers of severity such as high Killip score and ventricular tachycardia were associated with poor outcome in this study, as in previous investigations.

More information is clearly needed about factors associated with the prognosis of myocardial infarction in the post-thrombolytic era. Patients in hospital are easily accessible and data on these patients are often complete, which makes this an attractive group to study. However, it is important to bear in mind that hospitalized patients are prone to certain selection processes which can diminish both the validity and the generalizability of hospital-based studies. In the study by Widdershoven et al.[4] it is not possible to determine to what extent the fall in in-hospital case fatality rate is associated with a decline in length of hospital stay between 1982 and
It is also not apparent what constitutes a hospital death in the study. Spurious changes in in-hospital death rates can result from changing criteria for deciding whether a death has occurred in hospital or outside of hospital. If deaths occurring in the Accident and Emergency Department are counted as in-hospital in one year and out-of-hospital subsequently, the in-hospital case fatality rate will appear to have declined. The problem of case-mix is a third factor which can bedevil the interpretation of changes in in-hospital case fatality. Greater public awareness of symptoms of acute myocardial infarction, changing hospital admission policies and the introduction of more sensitive diagnostic tests may all lead to the admission of milder cases which are associated with lower case fatality rates.

While this article provides useful data in an important area, studies which include both in-hospital and out-of-hospital cases of myocardial infarction, use standardized definitions of disease and which attempt to avoid selection biases, are needed to elucidate recent changes in survival from myocardial infarction.

References


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Non-cardiac origin of out-of-hospital cardiac arrests: do we underestimate their frequency and prognosis?

See page 1122 for the article to which this Editorial refers

In this issue Kuisma et al. present new evidence on the underestimation of incidence and survival of out-of-hospital arrests of non-cardiac origin. Using the Utstein reporting style, the population-based study describes common causes of out-of-hospital arrests and identifies unique factors the survivors shared. A startling 34% of all out-of-hospital arrests were non-cardiac in origin, contrasting with previous studies attributing 80% of out-of-hospital arrests to cardiac origin. The most common precipitating insults in the non-cardiac origin arrest group were first, trauma, then non-traumatic bleeding, followed by intoxication, near drowning, and pulmonary embolism. Observations drawn from this data set require cautious interpretation due to the modest sample size. However, the results of the Helsinki research team add perspective to several crucial resuscitation topics.

Summarizing data about this mixed aetiology is often termed 'special situations'. Special situations present nomenclature problems, even when aided by the Utstein reporting style and the European Resuscitation Council et al. definitions. The European Resuscitation Council et al. suggested reporting non-cardiac origin arrests using 17 arrest categories. These authors offer a general definition, classifying the 17 categories into three groups: