

First myocardial infarction in a Dutch general practice population: trends in incidence from 1975–2003

Carel Bakx, Judith Schwarte, Henk van den Hoogen, Hans Bor and Chris van Weel

ABSTRACT

Background

As morbidity registrations generally do not make distinct first and following myocardial infarctions, it is still unclear as to what extent the falling rates of myocardial infarctions are caused by lower incidences of first myocardial infarctions.

Aim

To investigate the incidence of first myocardial infarctions in a general practice population.

Method

Data were taken from the Continuous Morbidity Registration (CMR) Nijmegen, which has been collecting data from four general practices since 1971. For the 1975–2003 period, sex-specific and age-specific yearly incidence rates were obtained from the registration data of the CMR. Trends were studied with Poisson regression.

Results

During the study period, 827 patients with a first myocardial infarction were identified. The incidence of first myocardial infarctions has declined since 1986 to 2.1 per 1000 for men and to 1.5 per 1000 for women. The average age of getting a first myocardial infarction increased with 3 years for men and slightly decreased for women. Since 1986, the incidence of sudden cardiac death from a first myocardial infarction has considerably declined for men and women to 0.9 and 0.7 per 1000 respectively.

Conclusion

A slight, significant, decline in incidence of first myocardial infarctions was found. From the mid eighties a mean annual decline of 3.5% in death from first myocardial infarction was observed. Though the variance in rates of coronary heart diseases is not unambiguous, this may indicate an effect of primary prevention. The decline was more pronounced in men, with an increasing age of getting a first myocardial infarction.

Keywords

epidemiology; family practice; myocardial infarction; vital statistics.

INTRODUCTION

Rates of morbidity and mortality from coronary heart disease (CHD) have declined over the past decades.¹ It is, however, unclear whether this decline is caused by effective intervention and medical care of CHD, or due to effective management of cardiovascular risk factors or other unknown factors. Several studies have reported a positive relation between both prevention and treatment and the decrease in mortality from CHD.^{2–4} But the decisive role is seen in improved treatment of CHD.⁵

There is little information on the decline in incidence of first myocardial infarctions. Morbidity registrations usually do not make this distinction and only report aggregate figures; data on the incidence of first myocardial infarctions and out-of-hospital cardiovascular deaths are poorly available.⁶ The assumption is that if primary prevention has been effective, a decline in the incidence rate of first myocardial infarctions should be observed.

In studying the effects of primary prevention, lifetime first myocardial infarctions should be distinguished from infarctions following this first one ('secondary infarctions'). For that reason we analysed the incidence of first myocardial infarctions over the period 1975–2003, as recorded in the Nijmegen Continuous Morbidity Registration

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(CMR).^{7,8} This general practice based registration applied over the years the same diagnostic criteria, while distinguishing between incident and prevalent cases as well as between a patients' lifetime first and second myocardial infarction. From this, a trend in incidence and mortality over time of myocardial infarctions in the population can be assessed.

METHOD

The present study has a descriptive design, analysing annual incidence of first myocardial infarction, age of first infarction and mortality of first infarction from 1975–2003. Five-year moving incidence rates are presented, standardised for the sex and age composition of the Dutch population in 1990. The data used originated from the CMR project of the University Medical Centre, Nijmegen. This project records on an ongoing basis since 1971 all health problems presented by patients to their GPs in four family practices (practice population approximately 12 000 patients), including deaths and causes of death. Since 1971, coding is based on the translated British E-list.⁹ The data recording reflects the Dutch healthcare system, with patients listed with a GP over a longer period of time and having to turn to this GP in order to obtain medical care. Diagnoses made by specialists after referral are reported back to the GP and are entered in the CMR database.^{7,8}

Selection and definition of episodes

This study was based on all recorded episodes of myocardial infarction since 1975. All patients were retrieved with the E-list codes 'myocardial infarction', and 'sudden death', and the patients' first lifetime event was entered in the study, together with the date of occurrence. We examined whether patients were already under treatment for angina pectoris before suffering from their first myocardial infarction. For angina pectoris, one of the following criteria has to be met: precordial chest pain characteristic for angina pectoris, ischaemia on the electrocardiograph (ECG), or confirmed sclerosis on angiography.¹⁰ We verified all recorded first episodes of myocardial infarctions in the original patients' files (including specialists' reports after referral and admission to the GP) against the criteria of International Classification of Health Problems in Primary Care (ICHPPC).¹¹ Myocardial infarction was defined as two or three of the following: typical history of chest pain; typical abnormalities of ST-depression on the ECG, and; elevated heart enzymes in a blood sample. Sudden cardiac death was defined as 'an unexpected natural death by cardiac cause within

How this fits in

This study is the first to report a decline in the incidence of first myocardial infarctions in an unselected general practice population. As an observational study, it cannot prove causality. Notwithstanding this, it may indicate an effect of primary prevention.

1 hour after the onset of symptoms'.¹² Only patients with a verified diagnosis were considered for the study.

Analysis

The data were arranged by year of occurrence. For every calendar year 1975–2003 the number of patients with a first myocardial infarction and sudden cardiac death was counted. Incidence was computed as number of new events per 1000 patients for each year. All data were standardised for the Dutch population in 1990. Incidence rates were computed by age and sex. As the yearly number of myocardial infarctions were small, we calculated the 5-year moving averages. Trends in incidence and mortality from first myocardial infarctions were analysed for 1975–1985 and 1986–2003. Because of the apparent split in trend in 1986, it was decided to choose that year as the cut-off point. Trends in the incidence of myocardial infarctions and deaths rates were calculated with Poisson regression with SAS Proc Genmod, using the yearly-standardised numbers.^{13,14}

RESULTS

A total of 867 patients were identified with a first myocardial infarction and/or sudden death in the period 1975–2003. The criteria for myocardial infarction and sudden cardiac death could not be confirmed in 40, so 827 patients were included in this study: 516 with a first myocardial infarction and 311 with sudden cardiac death from first myocardial infarction, so the overall case fatality was 37.7%. During the observation period a mean yearly number of 3.7% (standard error [SE] = 0.8) of the patients was already under treatment for angina pectoris before their first myocardial infarction was diagnosed.

Overall, women encounter just over half of the number of myocardial infarctions compared with men. Generally, women had their myocardial infarction about 6 years later than men, but the age difference has become less since the mid-1980s. The mean age of first myocardial infarctions in

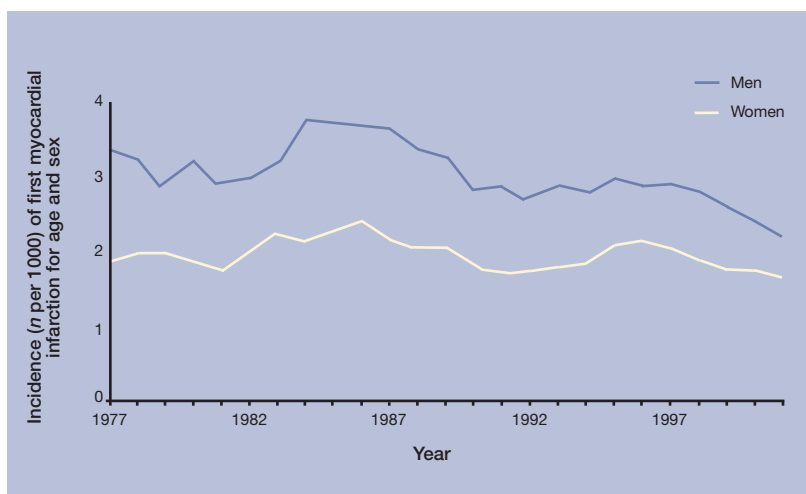


Figure 1. Incidence (n per 1000) of first myocardial infarction for age and sex; 1975–2003 moving average.

women was 74.2 years (SE = 1.3) in the 1983–1987 period and declined to 68.9 years (SE = 1.9) in the 1999–2003 period, while in men, the mean age rose from 63.1 years (SE = 1.3) to 66.1 years (SE = 1.3), respectively. The incidence of first myocardial infarctions showed a non-significant increase until 1986, both for men and women, and declined thereafter (Figure 1). Taking the 1986–2003 period, the incidence in men declined from 3.7 per 1000 persons to 2.1 per 1000 persons and from 2.7 to 1.5 per 1000 persons in women. The regression coefficient was -0.101 (95% CI = 0.158 to -0.045) in men and -0.038 (95% CI = 0.075 to -0.001) in women. A significant decline in the incidence of sudden cardiac death from first myocardial infarctions was observed between 1986 and 2003 for both men and women from 1.4 and 1.1 to 0.7 and 0.3 per 1000 respectively. The regression coefficient was -0.06 (95% CI = -0.09 to -0.03) in men and -0.06 (95% CI = -0.09 to -0.02) in women. In percentage, the average annual decline in mortality from first myocardial infarctions was 3.5% (95% CI = 1.4 to 5.6 %). Women who had died from sudden cardiac death were on average 5 years older than men dying from sudden cardiac death, and no clear change in age was observed over the study period.

DISCUSSION

This study is, as far as we know, the first to report the incidence of first myocardial infarctions over time in family practice. The number of participants in the present study, based on a dynamic population, is comparable with the Framingham cohort. Although the results in the present study are derived from a small population, the strength of this study is in the high consistency in data collection and application of (diagnostic) criteria over the time period considered. Throughout the

years the CMR has used the same diagnostic criteria and the same procedures with regular meetings of the participating GPs.^{15,16} The hypothesis that primary prevention should lead to a decline in the incidence of first myocardial infarctions was confirmed: a slight, significant declining trend in the incidence of first myocardial infarctions was seen in the 1990s, in line with mortality figures from coronary heart diseases in the Netherlands as well in other countries.^{4,5} The declining trend was less pronounced in women, which is in line with the Olmsted and Oxford studies.^{17,18} In contrast with others, our results suggest that the decline in mortality from cardiovascular disease was, at least for a small part, attributable to a decline in the incidence of first myocardial infarctions.^{19–21}

As there is no straightforward explanation for the changing rates of heart diseases, we cannot interpret the results of our study as to the effectiveness of primary prevention. So, restrictions on the interpretation of the results of our study have to be made. The present study was observational and therefore it cannot prove causality. As a consequence, primary prevention may have been reflected in falling rates of myocardial infarctions, but the converse is not absolutely true. The variance in rates of coronary heart diseases has never been explained by all the known risk factors. Population strategy for preventing ischaemic heart disease has been successful in terms of smoking cessation and lowering saturated fat consumption,^{22,23} applying for both primary and secondary prevention of myocardial infarctions. In addition, several other hypotheses for the declining cardiovascular mortality have been made.^{24,25}

On the other hand, primary prevention could lead to a reduction in the severity of myocardial infarctions and as a consequence lower both the incidence and the case fatality rate of first myocardial infarctions.²⁶ It is not plausible that a more aggressive treatment of angina pectoris caused the declined incidence of myocardial infarctions, as a low number of patients were under treatment for angina pectoris before their first myocardial infarction. At last, improved understanding of symptoms of acute myocardial infarctions among the general public and improved diagnostics of myocardial infarctions in primary care may have resulted in more frequent diagnoses of myocardial infarction that formerly went unrecognised. This may have resulted in an underestimation of the effect of primary prevention.

Notwithstanding the limitations, this study is the first to show information on the trends in incidence

of first myocardial infarctions in an unselected general practice population.

Competing interests

None

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