

Trends in rates of different forms of diagnosed coronary heart disease, 1978 to 2000: prospective, population based study of British men

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Abstract

Objective To examine trends over time in rates of different forms of diagnosed coronary heart disease among British men, during a period in which mortality due to coronary heart disease has been declining.

Design Prospective cohort study covering the period 1978-80 to 1998-2000.

Participants 7735 men, aged 40-59 at entry, randomly selected from one general practice in each of 24 British towns.

Main outcome measures Trends in the rates of major coronary events, first diagnosed angina and first diagnosed coronary heart disease (any fatal or non-fatal documented event or diagnosis). Events were ascertained from NHS central registers and reviews of medical records from general practices.

Results Over the 20 year period, 1561 major coronary events occurred; 1087 and 1816 men had new diagnoses of angina and coronary heart disease, respectively. The age adjusted annual relative changes were -3.6% (95% confidence interval -4.8% to -2.4% , $P < 0.001$) for all major coronary events, 2.6% (1.1% to 4.0% , $P < 0.001$) for first diagnosed angina and -0.8% (-1.8% to 0.3% , $P = 0.18$) for first diagnosed coronary heart disease. The fall in major coronary events occurred across all categories of event (fatal and non-fatal, first and recurrent). Similarly, first diagnosed angina increased for both uncomplicated angina and angina after myocardial infarction. The age adjusted annual relative change in case fatality at 28 days of first major coronary events was -1.4% (-3.1% to 0.4% , $P = 0.12$).

Conclusions Among British middle aged men, a substantial decline in the rate of major coronary events over the past two decades seems to have been largely offset by an increase in the incidence of diagnosed angina. Overall there was little change in the incidence of first diagnosed coronary heart disease. A continuing need exists for resources and services for coronary heart disease in general, and for new angina in particular.

Introduction

Since the late 1970s, rates of coronary heart disease death in the United Kingdom have fallen by more than

50% .¹ The monitoring trends and determinants in cardiovascular disease (MONICA) studies² and a previous report from the British Regional Heart Study³ show that this is due in part to a fall in the rate of occurrence of new major coronary events. However, little is known about trends in rates of "lesser" diagnoses, particularly angina, which makes a large contribution to the total incidence of diagnosed coronary heart disease.⁴ Using information from general practice medical record reviews we examined trends in rates of different forms of diagnosed coronary heart disease in the British Regional Heart Study during 20 years of follow-up, from 1978-80 to 1998-2000. In particular we assessed whether trends in the incidence of diagnosed angina and diagnosed coronary heart disease overall have followed a similar pattern to trends observed for rates of major coronary events.

Methods

The British Regional Heart Study is a prospective study of 7735 men aged 40-59 years at baseline (1978-80), who were randomly selected from one general practice in each of 24 British towns.⁵ The sample includes all major geographical regions in Britain and is representative of the male population in terms of social class distribution. Information from participants' questionnaires at study entry was used to ascertain diagnoses of pre-existing coronary heart disease. Participants were followed over 20 years through NHS central registers and regular reviews of medical records in general practices (including hospital and clinic correspondence) for death due to coronary heart disease, first and recurrent definite myocardial infarctions, first and recurrent possible myocardial infarctions, and first diagnosis of angina.⁶ About 1% of men have been lost to follow-up.

End points

We examined trends in rates of diagnosed (medically recorded) coronary heart disease only. See bmj.com for definitions of end points. We considered three main categories: all major coronary events (subdivided into death due to coronary heart disease and non-fatal



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Age adjusted estimates of annual relative percentage changes in rates of coronary events

Event rate	Total person years at risk	No of events	Age adjusted annual relative percentage change (95% CI)*	
			Entire 20 year period (1978-80 to 1998-2000)	Final 10 year period (1988-90 to 1998-2000)
All major coronary events:	138 111	1561	-3.6 (-4.8 to -2.4, P<0.001)	-3.6 (-6.3 to -0.9)
Coronary heart disease death	138 111	751	-4.8 (-6.5 to -3.1, P<0.001)	
Non-fatal definite myocardial infarction	138 111	810	-3.0 (-4.6 to -1.4, P<0.001)	
First major coronary event	128 916	1141	-3.5 (-4.8 to -2.1, P<0.001)	
Recurrent major coronary events	9 195	420	-3.9 (-6.1 to -1.7, P<0.001)	
First diagnosed angina:	126 228	1087	2.6 (1.1 to 4.0, P<0.001)	2.9 (-0.3 to 6.2)
Uncomplicated angina	121 332	840	2.4 (0.8 to 4.1, P=0.003)	
Angina after myocardial infarction	4 896	247	5.1 (2.1 to 8.2, P<0.001)	
First diagnosed coronary heart disease	121 024	1816	-0.8 (-1.8 to 0.3, P=0.18)	-0.4 (-2.9 to 2.2)

*Estimates obtained using Poisson regression, with generalised estimating equation estimates for the following end points: all major coronary events, non-fatal myocardial infarction, recurrent major coronary events. Adjusted for age and age squared (all end points) and age cubed (all major coronary events, first major coronary event, and first diagnosed coronary heart disease for 20 year follow-up).

definite myocardial infarction, and also into first major coronary event and recurrent major coronary events); first diagnosed angina (subdivided into uncomplicated angina, and angina after myocardial infarction); and first diagnosed coronary heart disease (any fatal or non-fatal documented coronary event or diagnosis).

Statistical analysis

We ascertained numbers of events and person years at risk during four exact five year follow-up periods from each subject's baseline assessment date. We used Poisson regression to estimate trends in event rates, with date of follow-up period as a continuous covariate and person time of follow-up as an offset. We adjusted for age using quadratic or cubic polynomials as necessary. We used generalised estimating equations to account for recurrent events from individual subjects. We also used Poisson regression to examine trends in the case fatality of first major coronary events (percentage fatal within 28 days), with date of event and age at event as covariates (see bmj.com).

Results

Overall there were 1561 major coronary events; 1087 and 1816 men had new diagnoses of angina and coronary heart disease respectively. The figure shows age specific trends for the three main end points and the table gives age adjusted estimates of annual trends, presented as relative percentage changes. The rate of major coronary events fell substantially over the 20 year period by an average of 3.6% per year. The decline occurred for both fatal and non-fatal major coronary events (although greater for fatal events), and for both first and recurrent major coronary events (being of similar magnitude in each case). In contrast the rate of first diagnosed angina increased during the 20 year period, by an average of 2.6% per year. This increase was apparent for uncomplicated angina and angina diagnosed after myocardial infarction, but it was larger for angina diagnosed after myocardial infarction. Because of the opposing trends in major coronary events and angina, the rate of first diagnosed coronary heart disease changed little over the 20 year period. Trend estimates for the last 10 year period of follow-up (table) indicate the same pattern of opposing trends for major coronary events and angina, and no clear change in the rate of first diagnosed coronary heart disease. Of all 1141 first major coronary events, 492 were fatal within 28 days. The average annual decline

in case fatality at 28 days of first major coronary events was moderate and non-significant (relative change in risk -1.4, 95% confidence interval -3.1 to 0.4, P=0.12 over the 20 year period).

Discussion

From 1978 to 2000, while rates of all categories of major coronary events declined among British men, the incidence of diagnosed angina increased, resulting in no apparent change in the overall incidence of diagnosed coronary heart disease.

Strengths and limitations of the study

The strengths include the geographically and socially representative nature of the study sample, the comprehensive ascertainment of coronary heart disease diagnoses from general practice, and the very high rate of follow-up. The limitations include the fact that trends are based on single measures of angina and other coronary heart disease from the medical record reviews. These measures may be subject to inaccuracies because of the original records and the review process. In this study, comparisons between medical record review and participants' self report for coronary heart disease diagnoses show good agreement, giving support to the validity of these measures.^{7 8} Diagnoses of angina did not require fulfilment of specific objective criteria and therefore reflect diagnosis as it occurred in clinical practice, not necessarily certain confirmed coronary disease. We included "possible" documented angina cases, but the trend was at least as strong when "possible" cases were removed (average annual change 3.7%, 95% confidence interval 2.1% to 5.3%). The trend estimates are driven by data from the middle age groups and are not necessarily generalisable to other age groups, or to women. The cohort design of the study prohibited investigation of age related heterogeneity in trends.

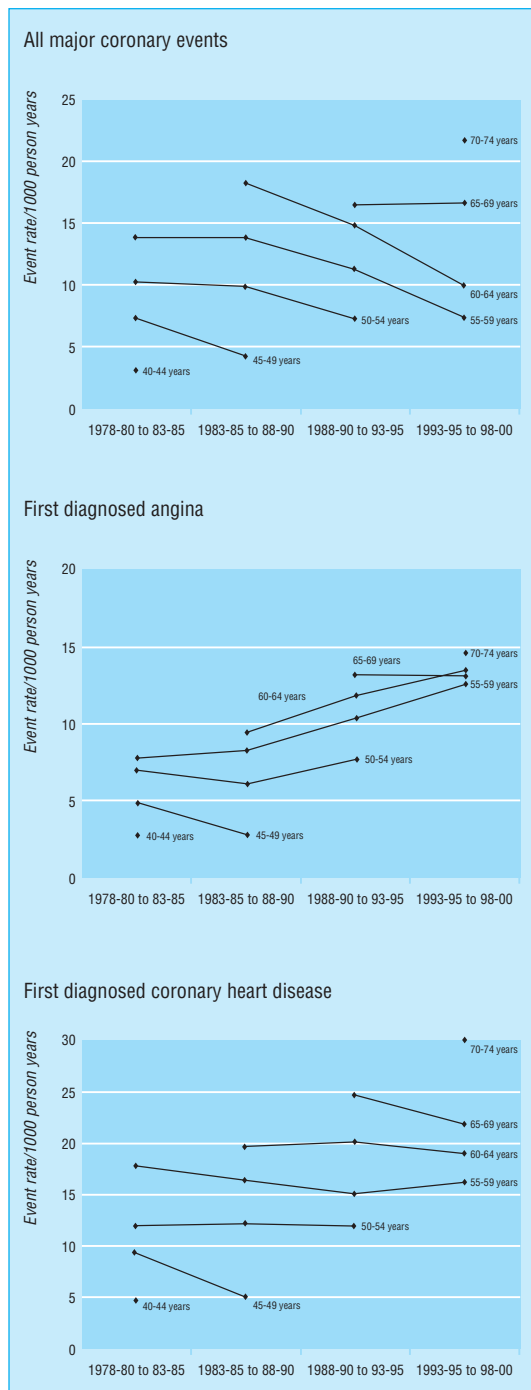
Trends in major coronary heart disease

Substantial declines in rates of both first and recurrent myocardial infarction indicate both a fall in incidence and an improvement in prognosis of myocardial infarction. These trends in acute event rates are likely to be due both to changes in risk factors and improvements in treatment.^{9 10} The fall in 28 day case fatality of first major coronary events was modest. A similar pattern of marked declines in both incidence and recurrence of myocardial infarction but a smaller decline in case fatal-

ity has been reported for the Finnish MONICA population during the period 1983-97.¹¹ In these populations, changes in primary and secondary preventive treatments may have had a greater role than changes in acute coronary care. However, unless case fatality is restricted to patients admitted to hospital, the impact of improvements in acute care is limited.^{12 13}

Opposing trends in angina and major coronary heart disease

We know of no previous reports of angina incidence trends in Britain based on reviews of medical records from general practices. However, the England and Wales



Rates of coronary events (per 1000 person years) by calendar period and age group at start of period

What is already known on this subject

Death rates due to coronary heart disease have been falling steadily in Britain since the late 1970s

Previous studies have shown that the incidence of major coronary heart disease has also fallen over this period

Much less is known about changes in the incidence of angina; previous studies have only included cases in patients who had been admitted to hospital

What this study adds

Although rates of major coronary events fell among British men from 1978 to 2000, the incidence of diagnosed angina (ascertained from general practice record reviews) seems to have increased over this period

The opposing trends in major coronary events and angina resulted in no apparent change in the overall incidence of diagnosed coronary heart disease

The increase in incidence of diagnosed angina may be a feature of changes in diagnostic practice rather than a real increase in disease incidence

These results have implications for resources and services for coronary heart disease, especially those for angina

general practice morbidity surveys also indicated that secular trends differed for angina compared with myocardial infarction: the rate of consultation for angina increased among men and women in the 1990s compared with the 1980s, while the same statistic for myocardial infarction fell.¹⁴ A study based on emergency admissions to hospital in Scotland found that discharge rates for myocardial infarction fell during the 1990s, while those for acute (unstable) angina and other chest pain increased.¹⁵ These results raise the possibility that the pattern of coronary heart disease is shifting from major events to less severe manifestations of disease.

Is angina increasing in Britain?

Does the increase in the rate of diagnosed angina represent a genuine increase in the incidence of angina in Britain, or is it a feature of changes in diagnostic practice? Evidence from the British Regional Heart Study implies the latter explanation: the prevalence of angina symptoms (assessed by chest pain questionnaire on four occasions and irrespective of diagnosis) fell from 1978-1996, among men with and without a diagnosis of coronary heart disease.³ This seems to imply a fall in incidence for angina defined in a standardised way according to symptoms. It is therefore possible that the incidence of angina in the population has genuinely fallen, but that a greater proportion of all angina cases are now formally diagnosed. This increase may result from general practitioners prioritising the early identification and treatment of coronary heart disease, as well as from an increase in availability of diagnostic investigations for angina-like chest pain.¹⁶

Conclusions

The continued decline in the rate of major coronary events among British men does not seem to have resulted in a fall in the overall incidence of diagnosed coronary heart disease, because of the increase in the rate of new angina diagnoses. The trend in angina may well be due to diagnostic factors; possibly it will stabilise as diagnosis and investigation of coronary heart disease in Britain reaches a more "optimal" level and the burden of undiagnosed disease falls. Nevertheless, the trend raises concerns for health service resources for angina and suspected angina. The results also highlight the need for continued emphasis on the primary prevention of coronary heart disease.

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Comparison of descriptions of allocation concealment in trial protocols and the published reports: cohort study

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Abstract

Objectives To compare how allocation concealment is described in publications of randomised clinical trials and corresponding protocols, and to estimate how often trial publications with unclear allocation concealment have adequate concealment according to the protocol.

Design Cohort study of 102 sets of trial protocols and corresponding publications.

Setting Protocols of randomised trials approved by the scientific and ethical committees for Copenhagen and Frederiksberg, 1994 and 1995.

Main outcome measures Frequency of adequate, unclear, and inadequate allocation concealment and sequence generation in trial publications compared with protocols, and the proportion of protocols where methods were reported to be adequate but descriptions were unclear in the trial publications.

Results 96 of the 102 trials had unclear allocation concealment according to the trial publication. According to the protocols, 15 of these 96 trials had

adequate allocation concealment (16%, 95% confidence interval 9% to 24%), 80 had unclear concealment (83%, 74% to 90%), and one had inadequate concealment. When retrospectively defined loose criteria for concealment were applied, 83 of the 102 trial publications had unclear concealment. According to their protocol, 33 of these 83 trials had adequate allocation concealment (40%, 29% to 51%), 49 had unclear concealment (59%, 48% to 70%), and one had inadequate concealment.

Conclusions Most randomised clinical trials have unclear allocation concealment on the basis of the trial publication alone. Most of these trials also have unclear allocation concealment according to their protocol.

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