CARDIOVASCULAR MEDICINE

# The economic burden of coronary heart disease in the UK

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**Objective:** To estimate the economic burden of coronary heart disease in the UK using both direct and indirect costs.
**Design and setting:** A prevalence based approach was used to assess coronary heart disease related costs from the societal perspective.
**Patients:** All UK residents in 1999 with coronary heart disease (ICD 9 codes 410–414 and ICD10 codes I20–I25).
**Main outcome measures:** Direct health care costs were estimated from spending on prevention, accident and emergency care, hospital care, rehabilitation, and drug treatment. Direct non-health service costs were estimated from data on informal care. "Friction period" adjusted productivity costs were estimated using the human capital approach from lost earnings attributable to coronary heart disease related mortality and morbidity. The friction period is the period of employees' absence from work before the employer replaces them with other workers. Failure to adjust for this factor would overstate production loss.
**Results:** Coronary heart disease cost £1.73 billion to the UK health care system in 1999: £2.42 billion in informal care and £2.91 billion in friction period adjusted productivity loss; 24.1% of production losses were attributable to mortality and 75.9% to morbidity. The total annual cost of all coronary heart disease related burdens was £7.06 billion, the highest of all diseases in the UK for which comparable analyses have been done.
**Conclusions:** Coronary heart disease is a leading public health problem in the UK in terms of the economic burden from disease. Cost estimates would be substantially understated if informal care/productivity costs were excluded.

Coronary heart disease, defined in this study as *International classification of diseases* ICD 9 codes 410–414 and ICD10 codes I20–I25 (ischaemic heart diseases), is the leading single cause of death in the UK and one of the most important causes of years of life lost before the age of 65.[1 2]. At the age of 40, lifetime risk for developing coronary heart disease in the West is 50% in men and 33% in women.[3]

In economics, a cost or burden of illness study estimates the resources consumed in disease prevention, detection, and treatment. This type of study provides a potentially useful decision making aid for setting priorities in health care research, and has been conducted for many diseases in the UK.[4–18] Previous attempts to estimate the economic impact of coronary heart disease in the UK have focused only on cost items attributed to the health care system, the so called direct health care costs.[19–22] However, there are also substantial direct non-health service costs from the care of coronary heart disease patients provided by family members and friends, the so called "informal care" costs. The economy also suffers from productivity loss, because a high percentage of patients with coronary heart disease and the people who care for them would otherwise be in paid employment. The burden of productivity loss falls on employers as lost working days and on the government as incapacity benefits.

In order to obtain a more accurate and comprehensive assessment of coronary heart disease costs, there is a need to assess all three types of cost. Our primary objective in this study was to provide an analysis of the economic costs of coronary heart disease in the UK by including direct health care costs, informal care costs, and productivity loss. The cost estimates obtained from this study were then compared with cost estimates of other illnesses in the UK and with published coronary heart disease cost estimates of other OECD countries.

## METHODS

An outline of the methods used is given here. Additional technical details are available from the authors on request. A report on an earlier preliminary version of the study also contains some technical details.[23]

### Methodological background

Cost of illness studies are commonly conducted using either the "top down" or the "bottom up" approach. The former approach estimates economic cost by using aggregate data on mortality, morbidity, hospital admissions, general practice consultations, disease related costs, and other health related indicators. An advantage of the top down approach is that it makes use of national data, which are readily available. The bottom up approach uses information on disease and treatment probabilities from follow up studies to derive annual incidence estimates and associated costs. The main advantage of the latter approach is that it makes full use of available epidemiological data, but the construction of a bottom up model is more complex. In this study we employed a top down approach to attribute the total expenditure to coronary heart disease from morbidity, mortality, service utilisation, and other data.

The total cost estimate was obtained for the whole of the UK in 1999 (the base year) using a societal perspective. Where the available information covered only England or England and Wales, the estimates were adjusted at the UK level using the appropriate population ratio.[24] National Health Service costs were adjusted to 1999 prices using the hospital and community health services pay and prices inflation index for NHS costs, while productivity and informal care costs were adjusted using the average earnings index.[24 25] Costs occurring in different time periods (for example, productivity loss from

**Table 1** Coronary heart disease in the UK: prevalence and population

| Age group (years) | Prevalence of doctor diagnosed CHD in one year (%) | Total UK population with doctor diagnosed CHD in one year | Prevalence of ever having CHD (%) | Total UK population ever having CHD |
|---|---|---|---|---|
| Men | | | | |
| 16–24 | 0.1 | 3370 | 0.1 | 3770 |
| 25–34 | 0.1 | 4 690 | 0.4 | 18 760 |
| 35–44 | 0.7 | 28 000 | 0.9 | 36 000 |
| 45–54 | 2.4 | 90 480 | 4.3 | 162 110 |
| 55–64 | 7.9 | 224 360 | 13.6 | 386 240 |
| 65–74 | 10.0 | 231 000 | 20.2 | 466 620 |
| 75 and over | 12.5 | 182 500 | 23.4 | 341 640 |
| All men | 3.8 | 764 800 | 7.1 | 1 415 140 |
| Women | | | | |
| 16–24 | 0 | 0 | 0 | 0 |
| 25–34 | 0 | 0 | 0.3 | 13 740 |
| 35–44 | 0.3 | 12 030 | 0.6 | 24 060 |
| 45–54 | 1.1 | 41 800 | 1.8 | 68 400 |
| 55–64 | 4.4 | 128 920 | 6.3 | 184 590 |
| 65–74 | 6.8 | 211 750 | 12.5 | 343 750 |
| 75 and over | 11.1 | 303 030 | 18.4 | 502 320 |
| All women | 2.8 | 697 530 | 4.6 | 1 136 860 |

CHD, coronary heart disease.

each death) were discounted at the Treasury approved public sector rate of 6% per annum.

### Epidemiology of coronary heart disease

Various sources of epidemiological data on coronary heart disease from UK national health surveys and government statistics were used.[1 2 26–32] Prevalences and mortality rates from these studies were applied to the 1999 UK population to generate estimates of the numbers of coronary heart disease sufferers, coronary heart disease related general practice consultations, coronary heart disease related hospital admissions, and other relevant numbers needed for computing the cost of this disorder.

### Health service utilisation

The main health service related items used to prevent and treat coronary heart disease in the UK included the following:

- preventive care provided by general practice clinics
- health promotion activities provided by the NHS
- care provided by community health and social services
- accident and emergency care
- outpatient hospital care
- inpatient and day case hospital care
- cardiac rehabilitation services in hospital and community facilities
- drug treatment.

For preventive care provided by general practice, data on the consultation rates related to coronary heart disease were obtained from the fourth national study on morbidity and applied to the 1999 UK population to give an estimate of the number of coronary heart disease related consultations.[27] Direct estimates of the quantity of health promotion activities and the quantity of community health and social services were not available, so these were therefore estimated indirectly.

The total number of accident and emergency (A&E) attendances related to coronary heart disease was calculated by adding up the quantities of A&E episodes for acute myocardial infarction, acute coronary heart disease, subacute coronary heart disease, and old acute myocardial infarctions.[20 28] We derived these estimates from hospital episode statistics and assumed first, that an A&E attendance occurred in 25% of individuals who died before being admitted as hospital inpatients, and second, that half of all inpatient episodes of acute and subacute coronary heart disease and old myocardial infarction result in an A&E attendance.

The number of outpatient hospital attendances related to coronary heart disease was estimated by using coronary heart disease prevalence data from the *Health survey for England*, UK population data, and the difference in referral rates between coronary heart disease patients and all patients.[24 26] We assumed that half of the inpatient hospital episodes related to coronary heart disease were followed by at least one outpatient attendance. Numbers for inpatient hospital admissions and day case hospital admissions were obtained from hospital episode statistics.[28]

The number of hospital patients with coronary heart disease who completed cardiac rehabilitation programmes was obtained by the product of the completion rate of patients in such programmes (the drop out rate was estimated by Gray and colleagues [31]) and the numbers of individuals with coronary heart disease who had participated in these. The latter were derived from the product of the number of coronary heart disease hospital patients who survived from their hospital stay and the proportion of those patients who attended a rehabilitation programme.[1 26 30 32]

Data on the annual number of prescriptions used for the prevention and treatment of cardiovascular disease in England were obtained from the Department of Health.[1] These figures covered prescriptions made by pharmacists, doctors, and appliance contractors. A Department of Health report estimated that 48.9% of the prescriptions related to cardiovascular disease are for coronary heart disease.[2] The number of coronary heart disease related prescriptions was therefore obtained by adjusting the figure for cardiovascular disease related prescriptions accordingly.

### Estimation of direct health care costs

Direct health care cost estimates were obtained by assessing the value of resources used by the NHS and other government services to prevent, detect, and treat coronary heart disease and to provide cardiac rehabilitation programmes. The resource quantities used in the health services were derived from the sources mentioned above. The following sources of unit cost information were used for the types of health care included in this study: Netten and colleagues' study for primary care,[25] the NHS Executive's finance manual for A&E care and hospital outpatient care,[33] the NHS Trust financial returns form 2 (TFR2) specialty specific costs per inpatient day

**Table 2** Cost of coronary heart disease

| Type of resource used | Unit of measurement | Units of resources consumed | Average unit cost (£) | Total cost (million £s) | Sources of data used (reference number) |
|---|---|---|---|---|---|
| **Direct health care cost** | | | | | |
| Prevention | – | – | – | 12.60 | 20 |
| Primary care | Doctor consultations at clinic | 2 138 948 | 12.74 | 18.50 | 25, 27 |
| | Doctor consultations at home | 485 901 | 60.00 | 29.15 | 25, 27 |
| | Nurse consultations at clinic | 49 800 | 10.00 | 0.50 | 25, 27 |
| | Nurse consultations at home | 29 766 | 22.00 | 0.65 | 25, 27 |
| Accident and emergency dept | Attendances | 297 447 | 55.60 | 16.54 | 28, 33 |
| Hospital outpatient care | Attendances | 457 703 | 72.79 | 33.32 | 24, 26, 33 |
| Hospital inpatient care | Inpatient bed days | 1 967 985 | 466.08 | 917.25 | 28, 34 |
| Hospital day case | Day cases | 54 530 | 293.50 | 16.00 | 28, 34 |
| Drug treatment | Prescriptions | 53 457 249 | 8.90 | 558.17 | 1, 2 |
| | Dispensing | 53 457 249 | 1.54 | 24.20 | 1, 2, 35 |
| Cardiac rehabilitation | Rehabilitation programmes completed | 48 246 | 501.51 | 28.40 | 1, 26, 30, 31, 32 |
| Community health/social services | – | – | – | 74.80 | 2 |
| **Direct health care cost subtotal** | | | | **1 730.07** | |
| **Productivity loss** | | | | | |
| Mortality | Working years lost (men) | 135 066 | 22 706 | 653.36 | 24, 39, 40 |
| | Working years lost (women) | 15 499 | 16 023 | 47.84 | 39, 40 |
| Morbidity | Certified incapacity days from CHD | 65 400 000 | 79.77 | 2207.51 | 39, 41 |
| **Productivity loss subtotal** | | | | **2908.71** | |
| **Informal care cost** | | | | | |
| Hours of informal care for CHD | Hours of caring by economically active carers per annum | 29 550 000 | 8.32 | 245.94 | 36, 37, 39 |
| | Hours of caring by economically inactive carers per annum | 378 870 000 | 5.73 | 2170.51 | 36, 37, 39 |
| **Informal care cost subtotal** | | | | **2416.51** | |
| **Total economic burden** | | | | 7055.29 | |

for hospital inpatient care and day case care,[34] Gray and colleagues' study for cardiac rehabilitation,[31] and the Department of Health's estimates for average drug costs[1] and average costs of dispensing per prescription.[35] The values of resources consumed were derived by combining resource quantities used in the health services and their unit costs. Estimates of the quantities and unit costs of health promotion activities and community and social services were not available, so aggregate cost estimates were used instead.[2 20]

### Estimation of direct non-health service costs

The number of hours of informal care (not included as part of direct health care costs) was estimated by using: first, the number of people with long standing physical conditions; second, the number of informal carers; third, the prevalence of informal care by age group of dependents with long standing conditions; and fourth, the number of hours of informal care for coronary heart disease per week for all age groups. The data for these items were obtained from a Department of Health study on informal care[36] and the Office of Population Censuses and Surveys.[37] The cost of coronary heart disease related informal care was estimated using Posnett and Jan's method for measuring the opportunity cost of unpaid inputs.[38] The average net hourly wage was applied to informal care provided by carers under 65 who were economically active and in employment.[39] The average net wage per hour for caring services was applied for care provided by carers who were above 65 years of age, economically inactive, or unemployed.

### Estimation of productivity costs

Productivity cost items used in this study included forgone earnings related to mortality and morbidity attributable to coronary heart disease. There are various ways of calculating this. In the first instance, the productivity loss from mortality attributable to coronary heart disease was estimated by calculating the sum of the age and sex specific products of the following:

- the 1999 average annual earnings of workers[39]
- the average economic activity rate in 1999[24]
- the unemployment rate[24]
- the number of remaining working years to estimate the likely earnings that an individual who died in 1999 would otherwise have received from paid employment (it was assumed that among those who died, men would have worked to the age of 65 and women to the age of 60 had they not died)
- the number of coronary heart disease related deaths.[40]

The productivity loss of coronary heart disease related morbidity was then estimated by multiplying the number of certified days off work from coronary heart disease[41] by the mean daily earnings of UK workers in 1999.[39]

However, the total productivity loss as computed above is likely to be an upper limit to the "real" production loss from coronary heart disease and can be accurate only if absent workers with coronary heart disease are not replaced at work, which is unlikely. An alternative approach is to estimate the "friction period"—that is, the period of employees' absence from work before the employer replaces them with other workers. This is estimated to be about 90 days in the UK.[42] It has been calculated that each spell of incapacity to work in this country lasts for 232 days on average.[4] The friction period adjusted productivity loss is then obtained by multiplying the unadjusted productivity loss estimate by the friction period and then dividing this product by the average duration of each spell of work incapacity. This friction adjusted estimate of productivity costs is also reported in this study.

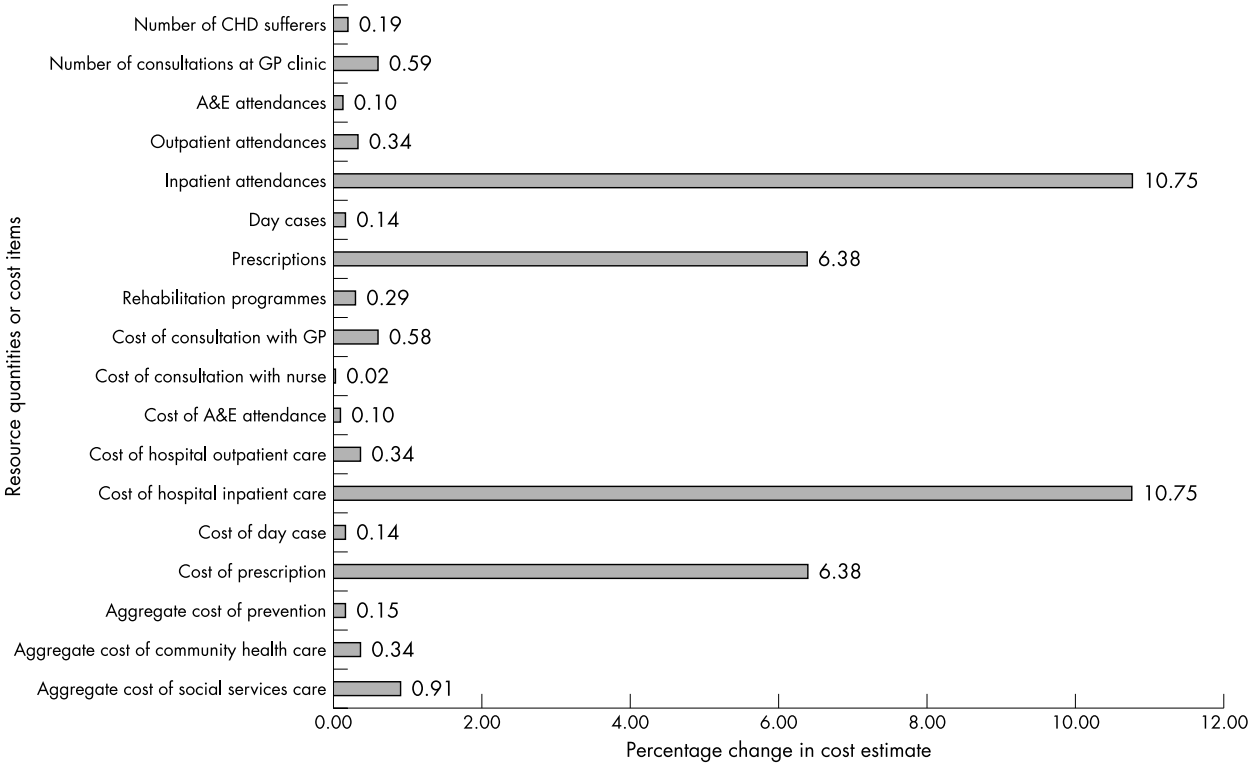


**Figure 1** Sensitivity of direct health care cost to 20% changes in key factors.

### Sensitivity analysis

Because a range of sources and assumptions was used, there is inevitably some uncertainty in the estimated costs of coronary heart disease. Sensitivity analysis was therefore conducted. The effects of 20% changes in the baseline resource quantities, unit costs, total costs, and other key data on direct health care costs, informal care costs, and productivity loss were tested. The effects of changes in discount rates on productivity cost were assessed by using rates of 2% and 10%. In addition to the one way sensitivity analysis described above, we tested the effect of 20% changes in all unit costs simultaneously. As the number of A&E attendances was estimated using two subjective assumptions made by us, the effect of 40% changes simultaneously in both factors was tested.

### Comparison of coronary heart disease costs with costs of other diseases

The UK costs of selected illnesses from other studies were compared with cost estimates of coronary heart disease obtained from this study.[4–18] These studies referred to different base years, so the reported costs were all recalculated in 1999 prices to improve comparability. The costs of coronary heart disease in selected industrialised countries were compared with UK estimates from our study. Cost estimates from different countries[43–47] (personal communication with the Swedish Heart Foundation) were recalculated in 1999 prices, converted to sterling using purchasing power parity exchange rates, and presented as costs per 100 000 persons to take into account the different population sizes of the countries compared. Purchasing power parity exchange rates are used to ensure that cost estimates are comparable between countries in terms of the purchasing power of the different currencies.

## RESULTS

### Prevalence of coronary heart disease

Table 1 shows a selection of the epidemiological data used to estimate coronary heart disease costs in this study. The *Health survey for England* indicated that the prevalences of coronary heart disease in 12 months (heart attack or angina in the past year) were 3.8% for men and 2.8% for women, and increased with increasing age in both sexes.[26] Extrapolating these estimates to the UK population, an estimated 765 000 men and 698 000 women had experienced a coronary heart disease event in the past year, with those aged 55 and above accounting for 88% of cases. The prevalences of "ever having had coronary heart disease" were 7.1% for men and 4.6% for women.[26] When extrapolated to the UK population, an estimated 1.42 million men and 1.14 million women have a history of doctor diagnosed coronary heart disease.

### Direct health care costs of coronary heart disease

The total direct health care costs of coronary heart disease in 1999 came to £1.73 billion (table 2). The major costs were those used for hospital inpatient care, which accounted for £917 million (or 53% of the total) and drug treatment, which accounted for £558 million (or 32% of the total). Rehabilitation and community care, prevention and primary care, and A&E and outpatient care accounted for 7.4%, 3.6%, and 2.9%, respectively, of total direct costs. People aged 65 years and above and men utilised 63% and 52% of total expenditure, respectively (results not shown).

### Informal care cost

An estimated 401 000 people provided informal care to coronary heart disease patients in the UK (result not shown), and about 408 million hours were used to care for them (table 2). Informal care of coronary heart disease sufferers was estimated to cost £2.42 billion.

### Productivity cost

The results showed that about 150 565 working years were lost from deaths from coronary heart disease in England and Wales (table 2); 71% of these working years lost were from deaths in men in the 45–64 year age range. The mortality cost of coronary heart disease in the UK was estimated to be about

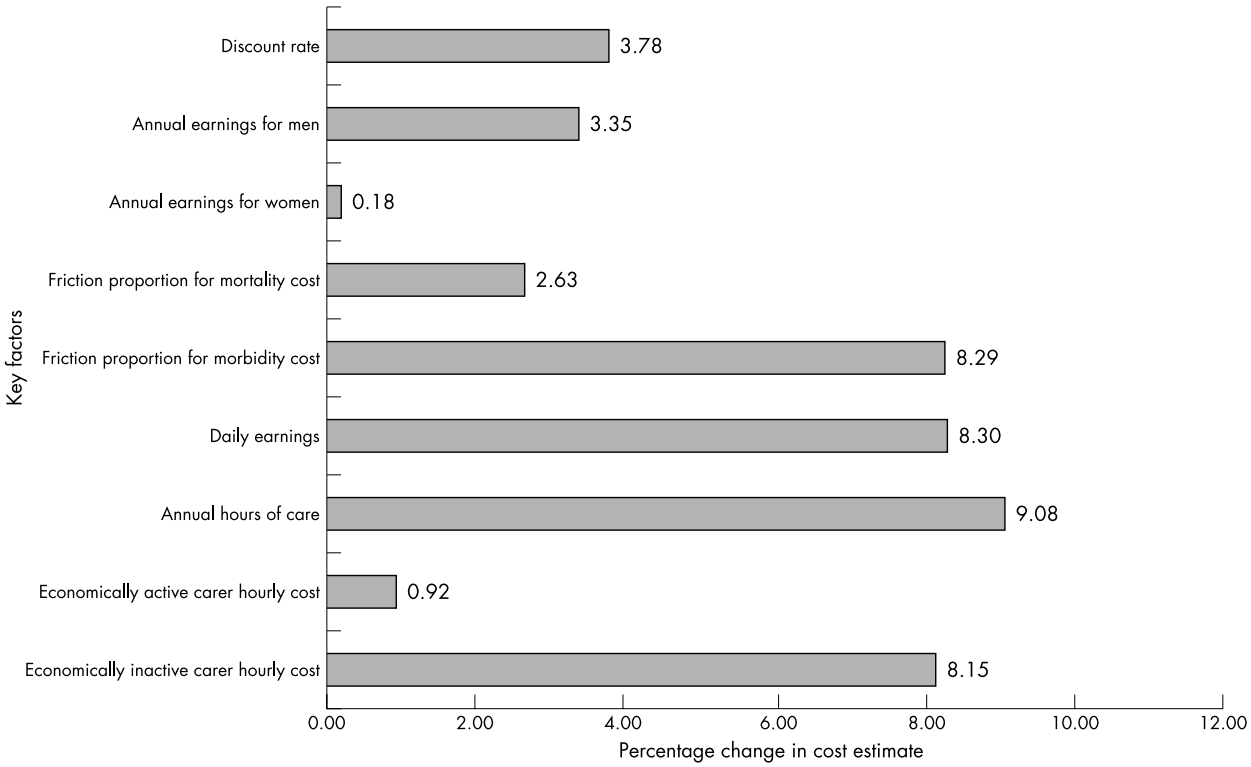


**Figure 2** Sensitivity of total employment cost to 20% changes in key factors.

£1.81 billion (of which £1.68 billion can be attributed to men and £0.123 billion to women), after adjustments for economic activity, unemployment, and differential timing. After adjusting for the friction period, a lower bound estimate of £701.2 million was obtained (£653.4 million for men and £47.8 million for women). There were 65.4 million working days lost because of incapacity resulting from coronary heart disease in the UK (table 2). Multiplying the number of working days lost by the average daily earnings for 1999 (£79.77) provided a morbidity cost estimate of £5.21 billion. After adjustment for the friction period, a lower bound estimate of £2.21 billion was obtained (£1.93 billion for men and £0.27 billion for women). A total production cost estimate of £2.91 billion was derived from the sum of the friction period adjusted cost estimates for mortality and morbidity.

### Sensitivity analysis

Overall, the baseline estimates of direct health care cost, productivity loss, and informal care cost related to coronary heart disease were not very sensitive to changes in the employed data (figs 1 and 2). Because of their relative size, fig 1 shows that changes in assumptions about prescriptions and the baseline volume and unit costs of inpatient care produced the largest variations in the baseline estimate of total direct health care cost (±6.38% and ±10.75% respectively). The estimate ranged from £1.47 billion to £1.83 billion with a 20% change in the volume or unit costs of inpatient cases. Similarly, the total cost estimate varied between £1.55 billion and £1.76 billion, with a 20% change in the volume or unit costs of prescriptions. Changes in the rest of the employed data had very small effects on the baseline direct health care cost estimate (range 0.02–0.91%).

**Table 3** Costs of selected diseases in the UK (1999 prices)

| Disease group | Direct health care cost (£ million) | Productivity loss and/or informal care cost (£ million) | Total costs (£ million) | Source |
|---|---|---|---|---|
| Coronary heart disease* | 1730 | 5325 | 7055 | Present study |
| Back pain* | 1673 | 5143 | 6816 | Maniadakis and Gray 2000[4] |
| Rheumatoid arthritis | 969 | 1049 | 2018 | McIntosh 1996[7] |
| Alzheimer's disease | 1993 | 0 | 1993 | Gray and Fenn 1993[12] |
| Lower respiratory tract infections | 1825 | 0 | 1825 | Guest and Morris 1996[6] |
| Stroke | 1655 | 0 | 1655 | Dale 1989[16] |
| Diabetes | 1304 | 0 | 1304 | Laing and Williams 1989[18] |
| Arthritis | 978 | 0 | 978 | Wyles 1992[13] |
| Multiple sclerosis | 85 | 452 | 536 | Holmes *et al* 1994[17] |
| Migraine | 45 | 378 | 424 | Bosanquet and Zammit-Lucia 1990[14] |
| Deep vein thrombosis and pulmonary embolism | 386 | 0 | 386 | Griffin 1996[5] |
| Depression | 366 | 0 | 366 | Jonsson and Bebbington 1994[10] |
| Insulin dependent diabetes mellitus | 273 | 0 | 273 | Gray *et al* 1995[8] |
| Critical limb ischaemia | 269 | 0 | 269 | Hart and Guest 1995[9] |
| Epilepsy | 235 | 0 | 235 | Griffin and Wyles 1991[15] |
| Benign prostatic hyperplasia | 134 | 21 | 155 | Drummond *et al* 1993[11] |

*Estimate adjusted for "friction" period (see text for explanation).

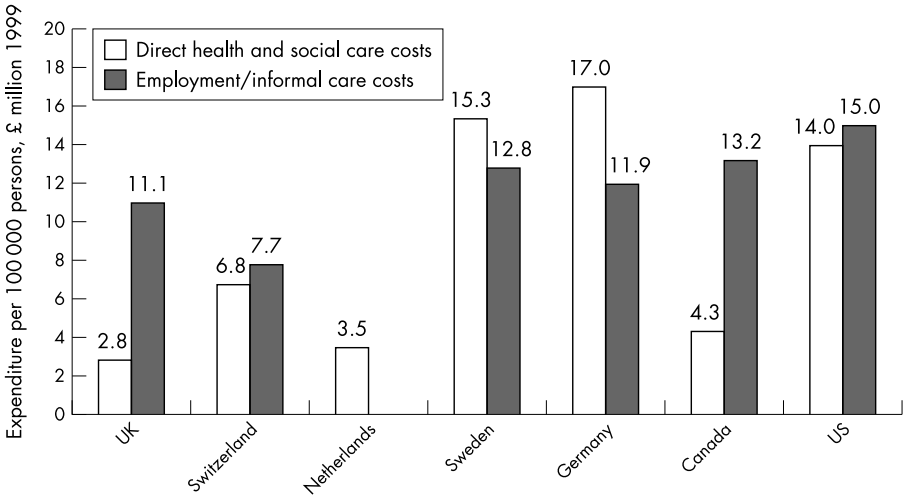


**Figure 3** Expenditure on coronary heart disease per 100 000 persons in selected OECD countries.

Figure 2 shows that the total productivity/informal care cost estimate was moderately sensitive to 20% changes in annual hours of care (±9.08%), average daily earnings (±8.30%), friction proportion for morbidity cost (±8.29%), and hourly cost of economically inactive carers (±8.15%). Changes in the rest of the key data showed small effects on the baseline (range 0.18–3.78%).

The simultaneous change of 20% in all unit costs resulted in direct health care cost estimates varying from £1.66 billion to £1.80 billion (±3.9% change from the baseline estimate), and productivity/informal care varying from £4.26 billion to £6.40 billion (±7.9% change from the baseline estimate). The effect of 40% changes simultaneously in assumptions used to derive A&E cost estimates resulted in a ±28.2% change in the baseline estimate for A&E costs but only a ±0.27% change in the baseline estimate for direct health care costs.

### Cost of coronary heart disease compared with other diseases and other countries

A comparison of coronary heart disease cost with other cost of illness studies showed that coronary heart disease generated the largest overall economic burden (table 3). The disease was the fourth highest in terms of its direct health care cost and the largest in terms of the indirect costs it generates. The expenditure for the prevention, detection, treatment, and rehabilitation of coronary heart disease is much lower than the production losses it generates.

Of the countries compared, the UK ranked the lowest for direct health care costs and the second lowest for productivity/informal care costs (fig 3). Productivity/informal costs were almost four times higher than direct health care costs in the UK.

## DISCUSSION

In this study we estimate that the total cost of illness associated with coronary heart disease in the UK is £7.06 billion per annum. Previous estimates of the economic burden of coronary heart disease ranged from £775 million to £1.5 billion in the UK.[19–22] These estimates differed substantially from ours because they were less comprehensive in the range of cost items included, and productivity and informal care costs were not considered.

In our comparisons of the costs of selected diseases in the UK, it was obvious that the estimates of economic burdens showed great variation between diseases. Many cost of illness studies focused on primary and hospital care, with relatively little emphasis on the measurement of productivity costs, informal care, and out of pocket expenses. Coronary heart disease is the most costly of the diseases compared in the UK, with productivity and informal care costs considerably exceeding direct health care costs. The comparisons also showed that the economic costs of coronary heart disease and back pain are much higher than other diseases that have been evaluated. Although some of the cost of illness studies are now rather dated, we have recalculated all cost estimates to 1999 prices to improve comparability between studies. However, the comparisons must still be treated with caution, because for most of the studies neither productivity nor informal costs were measured. Although our international comparison of coronary heart disease costs is not comprehensive, it does indicate that direct health care costs in the UK are low among the industrialised countries compared.

Our analysis of coronary heart disease cost took into account the duration of life lost, the duration of sickness, and the number of people suffering from the disease. The implicit assumption is made here that all the years lost attributable to the disease were years lived in a state of full health, and reductions in the quality of life of coronary heart disease patients were not assessed. This could in principle be done using quality adjusted life years, healthy year equivalents, or disability adjusted life years to adjust the duration of life for the quality of years lived, but because of a lack of available information, only length of life was considered in our study.[48 49]

In the one way sensitivity analysis, our direct health care cost estimate was most sensitive to assumptions concerning prescriptions and volume and unit costs of inpatient care, but even a 20% change in these items resulted in only moderate changes in the coronary heart disease cost estimate. The total employment cost estimate was moderately sensitive to 20% changes in annual hours of care, average daily earnings, friction proportion for morbidity cost, and hourly cost of economically inactive carers. We note that these data were obtained from reliable sources and thus are unlikely to deviate by up to 20%. The analysis could be refined, for example, through surveys which measure out of pocket expenses and which estimate more accurately the outpatient attendances by coronary heart disease sufferers after an inpatient hospital episode, and coronary heart disease related attendances at A&E departments. Updated and better estimates of the prevalence of coronary heart disease related informal care are also needed.

Some may argue that one way sensitivity analysis could substantially underestimate the uncertainty in cost of illness estimates. To address this concern, the effect of our simultaneous change of all unit costs by ±20% resulted in moderate changes in our estimates of direct health care cost and productivity/informal care costs, with the lower bound estimates still exerting a considerable cost on the health services and society. In addition, the simultaneous effect of 40%

changes in both of our assumptions underlying the A&E cost estimate had a very small effect on direct health care cost. The above sensitivity analyses seem to indicate that the employed methodology and findings are reasonably robust.

Although recent studies have shown the value of the burden of illness approach in informing research priorities,[48 50] questions about appropriate levels of spending on treatment and care cannot be dealt with by such studies alone, which indicate what the costs are, not whether they are too high or too low. Empirical data about the costs and effectiveness of treatments are needed to answer these questions.

## Conclusions

This study provided an improved estimate of coronary heart disease cost in the UK compared with previous attempts, showed that this disorder is a leading public health problem in terms of the economic burden from disease in the UK, and demonstrated that cost estimates would be substantially understated if productivity and informal care costs were excluded.

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