

Prevalence of ischaemic heart disease and its management with statins and aspirin in general practice in England and Wales, 1994 and 1998

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This paper examines the prevalence of treated ischaemic heart disease (IHD) and its management with statins and aspirin in England and Wales in 1994 and 1998. The data comes from 211 general practices with approximately 1.4 million patients that contributed to the General Practice Research Database. In 1998 the crude rate for treated IHD was 42.0 cases per 1,000 men and 32.4 cases per thousand women. There was a 13 per cent increase in prevalence in men and a 7 per cent increase in women compared with 1994. There was a five-fold increase in the use of statins to treat IHD between 1994 and 1998. Older patients and women were the groups least likely to receive treatment with a statin. Practices in the most deprived areas had higher rates of IHD but were less likely to use statins than practices in the least deprived areas. The findings suggest that positive steps have been taken to prevent further cardiac morbidity in people with IHD, but that there is still scope for improvement.

INTRODUCTION

Ischaemic heart disease (Box 1) is a common cause of mortality and morbidity in the United Kingdom. It resulted in over 110,000 deaths and 360,000 hospital admissions in England in 1998. Ischaemic heart disease (IHD) was estimated to cost the United Kingdom's health care system about £1.6 billion in 1996 and to cost the economy a total of £10 billion a year.¹ Mortality rates from IHD in the United Kingdom are amongst the highest in the world and reducing this burden of ill health is one of the government's priorities for health.

Among the drugs that can help reduce the impact of IHD are statins (which reduce cholesterol levels) and aspirin (an antiplatelet agent). Both statins and aspirin are highly effective in reducing the risk of sudden cardiac death and other acute cardiac events (such as myocardial infarction) in patients with pre-existing IHD. Statins can also reduce the risk of cardiac disease in patients with raised blood cholesterol levels but without pre-existing IHD.² The number of prescriptions for statins issued in the community in 2000 was almost 30 times greater than that in 1991 (Table 1). These figures demonstrate a rapid rise in the use of these drugs, but do not indicate whether some patients were more likely to receive treatment with statins than others, nor do they describe variation in the use of statins between GP practices.

Several previous studies have shown that there are large age, sex and geographic differences in the use of many specialist treatments for IHD such as coronary angiography, revascularisation treatment and cardiac rehabilitation.³ A few studies have also shown that there are differences in the way that statins are used in general practice.^{4,5} In particular, women and older patients seem less likely to receive these drugs.

Box one

ISCHAEMIC HEART DISEASE

- Ischaemic heart disease (IHD) is the major cause of death in England and Wales and resulted in over 110,000 deaths in England in 1998.
- It occurs when vessels that carry blood to the heart become narrowed or blocked resulting in an inadequate flow of blood to the heart.
- One or more diagnostic tests may be needed to establish the nature and severity of the disease. These include the electrocardiogram (ECG) at rest, the stress test, and x-rays of the coronary arteries (a coronary arteriogram or angiogram).
- The disease can be treated by controlling existing risk factors, which include high blood pressure, cigarette smoking, high blood cholesterol levels, excess weight and diabetes.
- Current symptoms and the risk of secondary illness can be modified by changing behaviour, the use of particular drugs such as statins and aspirin, or surgery.

The National Service Framework (NSF) for Coronary Heart Disease aims to reduce morbidity and mortality among people with established IHD and to reduce inequalities in the prevalence of the disease and the provision of care in the population. It sets out a standard that people with IHD should be offered treatment with a statin, unless contraindicated, to reduce their serum cholesterol levels to below 5 mmol per litre. Without treatment, most patients with IHD will have a blood cholesterol measurement above this level.

This study follows on from an earlier paper by Majeed *et al.*,⁴ which examined age and sex differences in the prevalence and treatment of IHD in 1996. The data described here relate to the prevalence and management of IHD in 1994 and 1998, allowing changes over time to be described and contains analyses of the impact of deprivation on the prevalence of the disease and its treatment. The results predate the introduction of the NSF for Coronary Heart Disease and so give baseline measurements of the prevalence and treatment of IHD, including age, sex and socio-economic variations.

Table 1

Prescribing of statins by general practitioners in England 1991–2000

Year	Total number of prescription items (millions)	Net ingredient cost (£ millions)
1991	0.33	10.99
1992	0.51	17.34
1993	0.65	22.44
1994	0.81	28.30
1995	1.12	42.05
1996	2.05	71.57
1997	3.32	114.67
1998	4.99	170.39
1999	6.99	237.82
2000	9.42	308.36

Source: Department of Health's Prescription Cost Analysis for England.

METHODS

Data source

The data for this study came from 211 general practices, total list size 1.4 million, in England and Wales contributing data to the General Practice Research Database (GPRD). The GPRD was originally set up in 1987 by VAMP Ltd. and was subsequently acquired by Reuters Health Information Ltd. who donated it in 1994 to the Department of Health. The Medicines Control Agency has been responsible for the overall management and financial control of the database since April 1999. The Office for National Statistics (formerly the Office of Population Censuses and Surveys) operated the database between 1994 and 1999.

General practices participating in the GPRD follow agreed guidelines for the recording of clinical and prescribing data. They submit anonymised patient-based clinical records to the database at regular intervals. Initially all practices contributing data to the database used VAMP Medical practice software. However, roughly a quarter of the 378 practices currently contributing now use ViSion practice software. Their data were not available for analysis purposes when this work was undertaken. The comprehensiveness and accuracy of the data recorded in the GPRD has been documented previously.⁶ The database has been used extensively for epidemiological research.

The practices included in this study are the same practices used in the publication *Key Health Statistics from General Practice 1998*⁷ (KHS98), the third in a series of reports which contains morbidity and treatment data derived from the GPRD. The 211 practices were selected because they are all situated in England and Wales; they contributed data to the GPRD throughout the period 1994 to 1998 using VAMP Medical practice software and their data passed regular quality checks. The practices' combined population had a similar age-sex composition to that of England and Wales in 1998.

Case and rate definition

Patients were included in the prevalence and disease management analyses if they were alive and permanently registered at the practice on the last day of the relevant year and had been registered for at least 6 months before that date. Therefore, only survivors are included and the more mobile population groups are under-represented. Cases of treated IHD were defined as patients who had a diagnosis of IHD ever recorded and who also received treatment with aspirin, or drugs in BNF Chapter 2 (cardiovascular drugs) during the analysis year.

Patients were included in the analyses of practice patients prescribed statins if they were permanently registered for any period during the analysis year. Cases were defined as patients who had at least one prescription of a statin during that year.

We also produced crude and age-standardised rates (all ages) with upper and lower 95 per cent confidence limits. The crude rates give an indication of the workload for GPs and the age-standardised rates make an allowance for differing age distributions between the years 1994 and 1998, between practices and between deprivation categories. We calculated the age-standardised rates by applying the age-specific rates, by 5-year age groups (except for ages 10–15 and ages 16–19), from age 0 until 85 and over, to one of our two standard populations. For the analyses of IHD prevalence and percentage of practice patients prescribed statins, we used the European standard population. However, for the analyses of IHD management we used the estimated number of cases of treated IHD in England and Wales in 1998 as our standard population. This was derived by applying the prevalence rates for treated IHD in the 211 practices to the estimated population of England and Wales in 1998 for the age groups described above.

Inter-practice variation

We calculated the prevalence of treated IHD, the percentage of practice patients prescribed statins and the percentage of IHD patients prescribed statins for each sex in each of the 211 practices. The range gives an indication of the variation in IHD prevalence and treatment with statins amongst the 211 practices. The inter-quartile ranges (25th percentile to 75th percentile) give the variation between the practices having excluded the values at the extremes of the distribution.

Deprivation

The five deprivation categories used in Table 5 are derived using the Townsend Material Deprivation Score.⁸ Each practice was allocated to a quintile on the basis of the Townsend Score of the ward in which it was located. This is a composite score calculated using information on unemployment, overcrowding, car availability and home ownership derived from the 1991 Census. The higher the score, the greater the level of relative deprivation. In KHS98 the Townsend Scores for all wards in England and Wales were arranged in ascending order of Townsend Score along with the total population of each ward in 1991. The wards were divided into five groups each of which contained 20 per cent of the total population of England and Wales. A range of Townsend Scores describes each of these population quintiles (named Q1, Q2, Q3, Q4 and Q5, where Q1 is the least deprived quintile and Q5 the most deprived). It was not possible to obtain ward information for one of the 211 practices and data for this practice were therefore not included in the deprivation analysis.

RESULTS

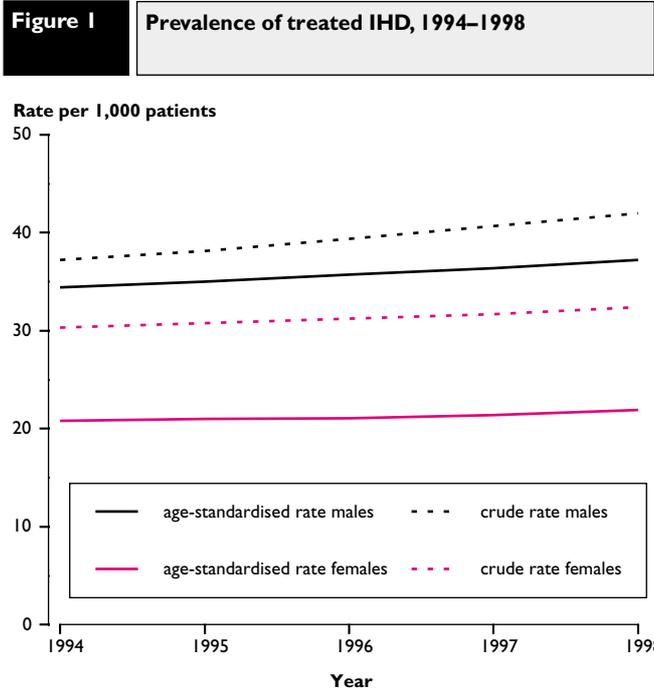
Prevalence of treated IHD in 1994 and 1998

We observed an increase in the prevalence of treated IHD in men and women in each year between 1994 and 1998 (Figure 1). This trend was visible before and after age-standardisation. The age-standardised prevalence rate for men increased by 8.1 per cent (Table 2). For women it increased by 5.3 per cent. Over the same period the crude rate rose by 12.9 per cent in men and by 6.9 per cent in women.

The prevalence of treated IHD increased with age in both years, except for men in the 85 and over age group. However, this age group experienced the largest increase in prevalence between the two years. The next largest increase in prevalence for men was among the 75–84 age group and in the 45–54 age group for women. The rate for women aged 35 to 44 fell by 10.5 per cent between the two years. Apart from in women aged 45 to 54, the largest increases between 1994 and 1998 were among women aged 65 and over.

Patients prescribed statins in 1994 and 1998

Table 3 shows the number of patients prescribed a statin or aspirin at least once during each year in each sex and age group, for all practice patients and for those patients with IHD. Overall, the use of statins in all practice patients increased at least five-fold between the years 1994



and 1998. For patients with IHD, there was a similar though slightly larger increase in the proportion prescribed a statin between the two years. Though the prescribing of aspirin was more common among IHD patients, there was a much smaller proportional increase in its use over the same period than was the case for statins (from 46.3 per cent to 61.5 per cent for men and from 36.0 per cent to 53.4 per cent for women).

This proportional increase in the use of statins with IHD patients between 1994 and 1998 was largest in patients aged 65 and over, though these are also the age groups least likely to be prescribed a statin (excluding the 0–34 age group, in which the number of cases was very low).

IHD patients aged between 35 and 64 were the most likely to receive a statin, though there was wide variation across age groups in the

Table 2 Prevalence of treated IHD by age and sex in 211 general practices in England and Wales in 1994 and 1998

			0–34	35–44	45–54	55–64	65–74	75–84	85 and over	Crude rate (all ages)	Age-standardised rate (all ages)*
Males	Prevalence of treated IHD per 1,000	1994	0.1	4.8	28.3	91.4	168.1	201.6	189.4	37.2	34.4
		1998	0.1	4.9	30.2	94.5	184.0	230.5	223.8	42.0	37.2
	Percentage change 1994–98		0.0	2.1	6.7	3.4	9.5	14.3	18.2	12.9	8.1
Females	Prevalence of treated IHD per 1,000	1994	0.1	1.9	12.1	47.8	105.8	158.1	165.2	30.3	20.8
		1998	0.1	1.7	13.0	49.3	111.5	166.6	180.0	32.4	21.9
	Percentage change 1994–98		0.0	-10.5	7.4	3.1	5.4	5.4	9.0	6.9	5.3

* Direct age-standardisation using the European standard population.

prescribing of statins. This variation decreased somewhat between 1994 and 1998. In 1994 those aged 55 to 64 were 2.6 times more likely to receive a statin than those aged 65 to 74. In 1998 they were 1.5 times more likely to receive a statin. The use of aspirin with IHD patients showed a much narrower variation across age groups in both years.

Inter-practice variation

Table 4 describes the inter-practice variation in the prevalence of treated IHD and the use of statins in the 211 GPRD practices in 1998. The variation in the prevalence rate for treated IHD in men and women was similar. The inter-quartile range (25th to 75th percentile) of the prevalence rate was considerably narrower in both sexes (34.9 to 50.5 cases per 1,000 men and 25.6 to 41.0 cases per 1,000 women). A reduced overlap in the range of the prevalence rate and a higher prevalence of the treated disease among men than women was also visible when the outlying values were excluded. The prevalence of the disease in men and women in each practice was highly correlated ($r=0.78$, $p<0.01$).

The percentage of practice patients prescribed a statin also ranged widely. As above, when extreme values were excluded the range narrowed (an inter-quartile range of 1.2 per cent to 2.0 per cent for men and 0.7 per cent to 1.5 per cent for women) and the percentage of men treated with a statin was higher than that for women (a median of 1.6 per cent for men and 1.1 per cent for women). The correlation between the percentage of men and women in each practice treated with a statin was also highly statistically significant ($r=0.65$, $p<0.01$).

The percentage of IHD patients prescribed a statin also varied widely between practices. Of the 211 practices, one did not prescribe a statin to any of its female IHD patients. Unlike the prevalence of the disease and the use of statins in practice patients, the inter-quartile range for each sex was very different (22.9 per cent to 34.0 per cent for men, median 27.8 per cent, and 13.5 per cent to 23.8 per cent for women, median 17.9 per cent). The correlation between the percentage of men and women with IHD prescribed a statin in each practice was statistically significant ($r=0.52$, $p<0.01$), but lower than that for the overall percentage of practice patients prescribed a statin.

Variation by deprivation category

Table 5 compares the prevalence of IHD and treatment with statins in the five deprivation categories. The prevalence of treated IHD ranges from a crude rate of 34.4 in the least deprived category to 37.8 per 1,000 patients in the most deprived category. A 40 per cent increase in the prevalence of treated IHD with deprivation category is also visible when the rates are adjusted for age differences between the categories, though the confidence limits overlap between Q3 and Q4.

There were small differences between the percentage of practice patients prescribed statins in the five deprivation categories. Though there is no consistent trend between the categories, a statistically significant greater percentage of patients were treated with a statin in Q2 and Q3 than in Q4 and Q5. There was also a reversal in the pattern of values between the rates before and after age-standardisation (an age-standardised rate of 1.3 per cent in the least deprived and 1.5 per cent in the most deprived category).

There was a fall in the percentage of IHD patients prescribed a statin between the least (Q1) and the most (Q5) deprived categories. This fall was also apparent and statistically significant after age-standardisation between the least deprived category ($asr = 28.5(27.3,29.6)$) and the most deprived category ($asr = 21.2(20.5,22.0)$).

DISCUSSION

Principal findings

Our study showed that the prevalence of treated IHD increased in both sexes between 1994 and 1998. There was an overall increase in the crude rate of about 13 per cent to 42 cases per thousand in men and almost 7 per cent to about 32 cases per thousand in women. The disease was most common in the 75–84 and 85 and over age groups and the greatest increase in prevalence was in the 85 and over age group (about 18 per cent in men and 9 per cent in women). The disease was more common in men than in women in each age group, though this gap decreases with age.

Statins became much more widely used both in general and in the treatment of IHD between 1994 and 1998. Their use increased at least five-fold in men and women with IHD and in practice patients in general, though they were used least among the two age groups with the highest IHD prevalence (75–84 and 85 and over). There is evidence that this is changing: the greatest increases in treatment with statins between the two years occurred in these same two age groups. By 1998, men with IHD in all age groups were more likely to be treated with a statin than women with IHD. This gender gap was most noticeable in people aged between 35 and 64 years.

There was some variation between practices in the prevalence of IHD and their use of statins, though within practices there were statistically significant correlations between the sexes in the prevalence of IHD and the use of statins in those with IHD and in practice patients in general. For each of these measures of disease prevalence and treatment, there was at least a one-and-a-half to two-fold difference between practices at the upper and lower end of the ranges, even after excluding extreme values.

After age-standardisation ischaemic heart disease was more common in practices located in areas of higher deprivation. Practices in the most deprived category may have had three or four more cases per thousand patients than those in the least deprived category. Patients with treated IHD in the least deprived practices were more likely to be prescribed a statin than those in the most deprived practices.

Strengths and weaknesses of the study

The GPRD has been used for epidemiological research for over 10 years. This study used the same 211 practices for the 1994 and 1998 figures. The population of these practices was large: 1.4 million in 1998, and their age/sex distribution was broadly similar to that of England and Wales in the same year. The data were held as individual patient records; participating practices agreed to record all significant morbidity events and all prescriptions for each of their patients, allowing the management of the disease to be described. The practices had to pass a number of quality standards before their data could be used in this analysis. However this still leaves room for variation between practices in the extent and thoroughness of their recording.

The definition of a case of IHD was the presence of a diagnostic code for the disease and a treatment with aspirin or a drug in BNF Chapter 2, rather than a diagnosis confirmed through tests or by a specialist. This is a useful definition, given the structure of the data. However, this definition may misidentify some patients who were not true cases if they were prescribed aspirin for another reason, and will miss cases that were not prescribed any of the relevant drugs. The prevalence and disease management calculations also excluded more mobile sections of the community and those who died during the analysis year. It was also not possible to determine whether some of the variations between practices were due to clinical factors such as disease severity or co-morbidities.

Table 3 Percentage of patients prescribed statins in 211 general practices in England and Wales in 1994 and 1998

		All patients				Patients with treated ischaemic heart disease					
		Males		Females		Males			Females		
		Total number of males	% prescribed a statin	Total number of females	% prescribed a statin	Total number of males	% prescribed a statin	% prescribed aspirin	Total number of females	% prescribed a statin	% prescribed aspirin
1994	0-34	288,992	0.0	283,154	0.0	32	6.3	43.8	22	0.0	40.9
	35-44	81,754	0.2	78,796	0.1	348	12.6	50.9	133	9.0	37.6
	45-54	74,049	0.6	71,237	0.3	1,911	11.4	42.9	785	6.2	34.4
	55-64	54,895	1.0	54,232	1.0	4,577	6.9	42.5	2,367	7.6	36.8
	65-74	45,071	0.6	52,519	0.8	6,803	2.6	49.7	5,029	3.8	37.0
	75-84	23,117	0.1	36,718	0.1	3,947	0.3	46.7	4,997	0.5	36.3
	85 and over	6,118	0.0	16,491	0.0	867	0.0	42.2	2,074	0.0	32.6
	All ages	573,996	0.3	593,147	0.2	18,485	4.2	46.3	15,407	3.0	36.0
1998	0-34	329,898	0.0	323,633	0.0	28	32.1	50.0	21	4.8	47.6
	35-44	102,316	0.6	98,117	0.2	447	53.2	59.5	153	29.4	49.0
	45-54	92,992	2.6	90,295	1.0	2,564	51.9	54.3	1,075	30.8	43.9
	55-64	68,955	5.7	67,582	3.9	5,978	43.4	59.2	3,061	34.7	51.2
	65-74	52,203	6.7	58,323	5.7	8,681	28.6	65.5	5,946	28.1	56.7
	75-84	29,944	2.5	45,326	2.2	5,937	9.7	61.7	6,605	9.0	53.8
	85 and over	7,977	0.3	20,724	0.2	1,351	1.5	60.2	2,860	1.0	51.4
	All ages	684,285	1.7	704,000	1.2	24,986	29.0	61.5	19,721	18.9	53.4

Table 4 Inter-practice variation in prevalence of treated IHD and use of statins in 211 general practices in England and Wales in 1998

	Males				Females			
	Median	Range	25 th percentile	75 th percentile	Median	Range	25 th percentile	75 th percentile
Prevalence of treated IHD per 1,000	42.7	14.6 – 76.3	34.9	50.5	31.2	7.1 – 74.3	25.6	41.0
Percentage of practice patients prescribed a statin	1.6	0.5 – 3.7	1.2	2.0	1.1	0.2 – 3.3	0.7	1.5
Percentage of treated IHD patients prescribed a statin	27.8	7.0 – 52.9	22.9	34.0	17.9	0.0 – 47.1	13.5	23.8

Table 5 Variation in prevalence of treated IHD and use of statins by deprivation category in 210 general practices in England and Wales in 1998

		Crude rate	Age-standardised rate (LCL,UCL)
Prevalence of treated IHD per 1,000*	Q1: least deprived	34.4	24.7 (24.1,25.4)
	Q2	37.6	27.0 (26.5,27.6)
	Q3	36.7	28.8 (28.3,29.4)
	Q4	38.2	29.4 (28.8,29.9)
	Q5: most deprived	37.8	34.8 (34.1,35.4)
Percentage of practice patients prescribed a statin*	Q1: least deprived	1.5	1.3 (1.2,1.4)
	Q2	1.4	1.3 (1.2,1.3)
	Q3	1.4	1.3 (1.3,1.3)
	Q4	1.5	1.4 (1.4,1.5)
	Q5: most deprived	1.3	1.5 (1.4,1.5)
Percentage of treated IHD patients prescribed a statin**	Q1: least deprived	27.3	28.5 (27.3,29.6)
	Q2	24.7	25.3 (24.4,26.2)
	Q3	23.9	23.7 (22.9,24.4)
	Q4	24.9	24.4 (23.6,25.1)
	Q5: most deprived	23.4	21.2 (20.5,22.0)

* Direct age-standardisation using the European standard population.
 ** Direct age-standardisation using all treated IHD patients as the standard population.

Comparison with other studies

There were two other studies which provided prevalence and prescription rates which could be compared in some detail: one national survey and one cross-sectional study based on data from general practice.

Primatesta and Poulter¹⁰ carried out an analysis of the numbers of people with and without IHD using lipid lowering treatment from data gathered during the 1998 *Health Survey for England* (HSE). It used a nationally representative sample of about 14,500 adults living in non-institutional households and defined IHD patients as those who reported a history of angina or myocardial infarction diagnosed by a doctor.

It was possible to aggregate some of the age groups used in our study to allow comparisons to be made. The age groups were to close or overlapped those used by Primates and Poulter in two cases. Our figures for the prescription of statins were within one percent of those derived from HSE for all lipid lowering treatments in each case. In the management of IHD with lipid lowering agents the situation was reversed: our rates were between 1.1 and 1.5 times higher.

Hippisley-Cox *et al*⁵ carried out a recent cross sectional study using a selection of 18 practices (about 98,000 patients) in the Trent region that used EMIS or Meditel software. Cases were defined as any patient having a diagnosis of IHD or at least one prescription for a nitrate. Our crude prevalence rates were about 1.3 times higher than those reported in this study. They also looked at IHD management with aspirin and lipid lowering agents, though they do not describe whether they had any limits for these events. Their figures for the treatment with aspirin and statins were, respectively, 1.3 and 1.1 times higher than those derived from our data. They also reported adjusted odds ratios for the proportion of men and women that received a lipid lowering treatment in the age groups 45–54 and 55–64. These results matched the proportion of male to female patients prescribed a statin in 1998 in our study.

Implications for policy and practice

This study offers information that describes the treatment of IHD in general practice, and the variations in its treatment between practices, across different ages and by sex, by the deprivation of the area in which the practice was located, and over a five-year period.

The use of statins to treat IHD increased noticeably, though this increase was not consistent across the population. Older patients and women were the groups least likely to receive a statin. There was also variation between practices, some being over 50 per cent more likely to treat IHD with a statin. Practices in the most deprived areas treated more cases of IHD but were less likely to treat it with a statin than those in the least deprived areas. There appears to be scope for more standardised treatment of this disease in general practice and the NSF for Coronary Heart Disease may help achieve this.

The government has committed itself to improving the care of people with IHD and to reduce inequalities in the provision of services for this condition. This study provides baseline information from before the introduction of the NSF, which could help assess the impact of its efforts. One of the key targets in the NSF is for Primary Care Trusts to establish disease registers in primary care. Hence, Primary Care Trusts may find the prevalence rates reported in this paper useful in estimating how complete their own registers are likely to be. The information on treatment rates will also allow them to compare their local treatment rates with those for England and Wales derived from the general practices in the GPRD.

CONCLUSIONS

Statins have been shown to be effective in the secondary prevention of IHD. The five-fold increase in their use between 1994 and 1998 in patients with IHD is a positive step toward the prevention of further cardiac morbidity in this group. However, the pattern of use of these drugs still varies; older patients, women and people with IHD living in more deprived areas all being less likely to receive treatment with statins.

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Key findings

- The prevalence of treated ischaemic heart disease increased in people aged 45 years and over between 1994 and 1998.
- There was at least a five-fold increase in the use of statins in patients with ischaemic heart disease and in practice patients in general between 1994 and 1998.
- In 1998 men with IHD were about 50 per cent more likely to receive treatment with a statin than women with IHD.
- The increase in the use of statins with IHD patients between 1994 and 1998 was largest in patients aged 65 years and over, though these patients remain the group of patients least likely to be prescribed a statin.
- When account was taken of the age differences between the two areas, treated IHD was approximately 40 per cent more common in the most deprived than in the least deprived areas.
- When account was taken of the age differences between the two areas, patients with IHD were approximately 25 per cent less likely to be treated with a statin in the most deprived than in the least deprived areas.

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