

Sex inequalities in ischaemic heart disease in general practice: cross sectional survey

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Abstract

Objective To study differences in treatment for men and women with ischaemic heart disease by using standards defined in England's national service framework for coronary artery disease.

Design Cross sectional survey using routinely collected data.

Setting 18 practices in 18 primary care groups in Trent Region.

Subjects 5891 men and women aged over 35 years with a diagnosis of ischaemic heart disease or prescription for nitrates recorded on computer.

Main outcome measure Difference in the proportion of men and women with ischaemic heart disease and taking lipid lowering treatment.

Results Women were less likely than men to have a recording of body mass index (79% (2197/2783) *v* 82% (2552/3102), $P = 0.002$), smoking (86% (2386) *v* 89% (2779), $P < 0.0001$), and blood pressure (95% (2643) *v* 96% (2986), $P = 0.04$). Women were also less likely to have a recording of fasting cholesterol concentration (35% (968) *v* 50% (1550), $P < 0.0001$) but were more likely to be obese (25% (558/2197) *v* 20% (514/2552), $P < 0.0001$) and have their most recently recorded blood pressure value over the recommended 140/85 mm Hg (60% (1598/2643) *v* 52% (1553/2986), $P < 0.0001$). Although a higher proportion of women had a raised serum cholesterol concentration (77% (749/968) *v* 67% (1043/1550), $P < 0.0001$), men were more likely to take aspirin (76% (2358) *v* 71% (1979), $P < 0.0001$), have a recorded diagnosis of hyperlipidaemia (13% (418) *v* 10% (274), $P < 0.0001$), and be prescribed lipid lowering drugs (31% (973) *v* 21% (596), $P < 0.0001$). These differences remained despite adjustments for the practice where the patient is registered, age, smoking status, obesity, diabetes, and hypertension.

Conclusion The results suggest a systematic bias towards men compared with women in terms of secondary prevention of ischaemic heart disease.

Introduction

The UK Department of Health's publication *Our Healthier Nation* outlines its aims to improve the health of the poorest people and narrow the health gap in England.¹ The national service framework for coronary artery disease sets out the blueprint for tackling heart

disease, one of the leading causes of death in Britain.² It requires general practitioners to identify all patients with ischaemic heart disease and offer appropriate treatment to reduce their coronary risk. In secondary care, inequalities exist in access to treatment for coronary heart disease. There is a strong social gradient, for example, for access to coronary artery bypass grafts and angiography, with poorer patients having less access than more affluent patients.³ Similarly, women with angina are less likely to be referred to a specialist⁴ or to have revascularisation⁵ than men. In secondary care, further inequalities exist between the sexes—in investigation and use of drug treatment.^{6 7}

Inequalities may exist in primary care for patients with ischaemic heart disease, although the evidence so far is limited to the prescription of aspirin—women with angina are less likely to be prescribed antiplatelet treatment than men.⁸

We aimed to determine the extent of sex inequalities in the management of ischaemic disease in primary care using standards defined in the national service framework for coronary artery disease.² Our principal objective was to determine differences in the proportion of men and women with ischaemic heart disease who are tested and treated for hyperlipidaemia.

Methods

Recruitment and ethical approval

From 51 primary care groups in the Trent health region 65 practices were randomly selected and contacted; 24 of these volunteered to take part, of which 18 were recruited. Ethical approval was obtained for the study.

Our main target population included all registered patients aged over 35 years with a Read code for ischaemic heart disease or with at least one prescription for a nitrate.⁹

Variables

We used MIQUEST¹⁰ to extract the following data for the target population: details of ischaemic heart disease; comorbidity (diabetes, hypertension, and stroke); drug treatment; recorded contraindications for aspirin; and other risk factors for heart disease (age, sex, family history of cardiovascular disease, most recent smoking status, weight, height, body mass index, systolic and diastolic blood pressure, recorded HbA_{1c}, and all fasting serum cholesterol values). These data



The full version of this paper appears on the BMJ's website

were used to compare levels of computer recording for morbidity and lifestyle data as well as disease management, such as the proportion of patients taking aspirin or lipid lowering drugs and whose blood pressure was controlled (< 140/85 mm Hg).

Analysis

The main outcome variable was the difference in the proportion of men and women with ischaemic heart disease taking lipid lowering drugs. We used unconditional logistic regression to determine differences in the recording and management of ischaemic heart disease between men and women, simultaneously adjusting for known cardiovascular risk factors. We also included a factor for the patients' general practice in the multivariate logistic regression analysis.

Sample size

Before the study we established that a sample of 4224 patients with ischaemic heart disease would have a 95% power at the 0.01 significance level to detect a relative risk of 1.5 for the use of lipid lowering drugs in men. Nineteen practices would need to be recruited to generate such a sample.

Results

Study population

Of the 98 137 patients registered with the study practices, 5891 (6%) had a recorded diagnosis of ischaemic heart disease or at least one prescription for nitrate ever, or both of these; 2783 were women. The practices were representative of others in Trent in terms of morbidity, number of hospital admissions, and demography.

Comorbidity, lifestyle data, and secondary prevention

Men were more likely than women to have a recorded diagnosis of myocardial infarction. Women were more likely to have a recorded diagnosis of hypertension, which was largely explained by the greater proportion of women aged >75 years. No significant differences were found between men and women for the recording of diabetes or stroke (for more detail see the full version of this paper on the *BMJ's* website).

Women were on average older (mean age 72 years, compared with 67 years for men, $P < 0.0001$). Men were more likely to have their height, weight, and body mass index recorded (table 1); of patients with a recorded body mass index, women were more likely to be obese. Men were more likely to have smoking status recorded (table 1); men were more likely to be former or current smokers. They were also more likely to be recorded as taking aspirin (table 2) and to have a blood pressure value recorded (table 1), although the difference was not clinically important. Women were more likely, however, to have their last blood pressure reading above the new target value of 140/85 mm Hg (table 1). Men were more likely to be recorded as taking aspirin (table 2).

Recording of fasting serum cholesterol concentration

Men were more likely to have a fasting serum cholesterol concentration recorded (table 2); in the subgroup of practices with electronic links for pathology results, men were still more likely than women to have a recorded fasting serum cholesterol

Table 1 Lifestyle data for 2783 women and 3108 men with ischaemic heart disease

Variable	No (%) of women	No (%) of men	P value (χ^2 test)
Height recorded	2218 (80)	2589 (83)	<0.0001
Weight recorded	2305 (83)	2645 (85)	0.02
Body mass index recorded:	2197 (79)	2552 (82)	0.002
Index >30 (kg/m ²)	558 (25)	514 (20)	<0.0001
Blood pressure recorded:	2643 (95)	2986 (96)	0.04
Last recording >160/90 mm Hg	675 (26)	544 (18)	<0.0001
Last recording >140/85 mm Hg	1598 (60)	1553 (52)	<0.0001
Smoking status recorded:	2386 (86)	2779 (89)	<0.0001
Non-smoker	1648 (69)	1477 (53)	<0.0001
Former smoker	330 (14)	686 (25)	
Current smoker	408 (17)	616 (22)	
Any family history recorded	1526 (55)	1805 (58)	0.01
Family history of cardiovascular disease	881 (32)	995 (32)	0.77

Table 2 Secondary prevention measures in 2783 women and 3108 men with ischaemic heart disease

Variable	No (%) of women	No (%) of men	P value (χ^2 test)
Fasting serum cholesterol recorded:	968 (35)	1550 (50)	<0.0001
Maximum level >5 mmol/l	749 (77)	1043 (67)	<0.0001
Most recent level >5 mmol/l	809 (84)	928 (60)	<0.0001
Recorded diagnosis of hyperlipidaemia	274 (10)	418 (13)	<0.0001
Lipid lowering treatment	596 (21)	973 (31)	<0.0001
Aspirin	1979 (71)	2358 (76)	<0.0001
Recorded contraindication to aspirin	602 (22)	642 (21)	0.36
β blocker	1369 (49)	1589 (51)	0.14

concentration (odds ratio 1.8 (95% confidence interval 1.5 to 2.1); $P < 0.0001$). This association was weakly confounded by other risk factors. After adjustment for the men's general practice, age, diabetes, hypertension, obesity, and smoking status the adjusted odds ratio was only slightly higher (1.97 (1.67 to 2.32); $P < 0.0001$).

Diagnosis and treatment of hyperlipidaemia

Although men were more likely to have a test result recorded, women were more likely to have an abnormal reading (fasting serum cholesterol concentration >5 mmol/l). Despite this, men were more likely to have a recorded diagnosis of hyperlipidaemia and to have received lipid lowering treatment after adjustment for the above mentioned risk factors (adjusted odds ratio 1.42 (1.22 to 1.65); $P < 0.0001$). When we restricted the analysis to patients with a fasting serum cholesterol concentration >5 mmol/l, men were still more likely to receive lipid lowering treatment (1.30 (1.08 to 1.58); $P = 0.0007$).

Diabetes mellitus

Patients with both ischaemic heart disease and diabetes were more likely to be tested and treated for hyperlipidaemia than patients without diabetes. Despite adjusting for age, men with both diabetes and ischaemic heart disease were more likely to have their most recently recorded blood pressure below 160/90 mm Hg (1.9 (1.3 to 2.8); $P = 0.001$) and below 140/85 mm Hg (1.40 (1.04 to 1.97); $P = 0.03$).

We found no difference in the proportion of men and women with a recorded value for glycated haemoglobin concentration in the 655 patients who had

diabetes in addition to ischaemic heart disease (odds ratio 1.2 (0.8 to 1.8); $P=0.34$). In addition, we found no difference in the proportion of diabetic men and women with ideal control, according to the value of the most recently recorded glycated haemoglobin concentration ($<7.5\%$).

Discussion

Women with ischaemic heart disease in our study do not have lower risk profiles than men. Despite this, more men take aspirin, have a diagnosis of hyperlipidaemia, and take lipid lowering drugs. These differences persist when age and other risk factors are adjusted for, and they suggest a systematic bias towards men in terms of secondary prevention of ischaemic heart disease. Our findings are consistent with the sex bias reported in studies of the management of ischaemic heart disease in secondary care.^{6,7}

The results of the Scandinavian simvastatin survival study and the cholesterol and recurrent events study have shown that lipid lowering treatment is clinically effective in both men and women.^{11,12} The national service framework for coronary artery disease does not suggest sex differences in the management of secondary prevention of ischaemic heart disease.²

Strengths and weaknesses

We identified our target population from the practices' computer system. We used powerful NHS software (MIQUEST) to collect standardised datasets from practices and aggregate them for analysis. We could not adjust for deprivation as the ethical considerations meant that we were not allowed to extract strong patient identifiers, such as postcodes. We have not been able to validate the diagnoses of ischaemic heart disease by reference to manual records and previous investigations (for example, exercise electrocardiography, angiography), although validations done in previous studies show that important discrepancies are unlikely.⁹ We do not think this factor has confounded our results as the practices' diagnostic criteria and recording accuracy would apply equally to men and women. In addition, we performed a subgroup analysis on patients with more severe ischaemic heart disease (defined as those with a myocardial infarction or taking more than one anti-anginal drug), and our findings remained unchanged. Any misclassification would have tended to underestimate the odds ratios rather than the converse.

We used a large sample recruited from 18 practices spread throughout the Trent region of the NHS, giving us good statistical power and generalisability. The differences we detected are likely to be not only significant but clinically important.

We thank the 18 general practices that participated in the study.

Contributors: JH-C initiated the study, designed and undertook the analysis, interpreted the results, and jointly drafted the paper. MP contributed to the development of core ideas, the design, and the interpretation of the results and jointly drafted the paper. NC processed the ethical approval, recruited the practices, undertook the collection and manipulation of the data. NC and AM wrote the MIQUEST queries and contributed to the interpretation. AW contributed to the project management, the study design, and the interpretation of the results.

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Competing interests: None declared.

What is already known on this topic

England's national service framework for coronary artery disease requires general practitioners to identify and treat patients at high risk of ischaemic heart disease

Substantial evidence of sex inequality for this disease exists for access to secondary care less but less is known about equity for its management in general practice

What this study adds

Among patients with ischaemic heart disease, men were more likely than women to have cardiovascular risk factors and serum cholesterol concentration recorded on computer

A higher proportion of women, however, had raised cholesterol concentrations recorded on computer, but more men were treated with lipid lowering drugs

The results suggest a systematic bias towards men compared with women in terms of secondary prevention of ischaemic heart disease.

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Endpiece

Faint praise

When, as a sixth-former, I sent my first, almost-publishable poems to Ross, he returned them, but not with a printed rejection slip. "I like these, but not quite enough to take. A.R." Slender encouragement, but it was enough, more than I deserved, and it kept me writing.

Neil Powell in an obituary for Alan Ross, poet, cricket writer, and editor of the *London Magazine*