Evidence for a gender and age inequality in the prescribing of preventative cardiovascular therapies to the elderly in primary care

SIR—The decline in ischaemic heart disease (IHD) in Ireland has been slower in women compared with men [1] and previous evidence suggests that differential patterns exist for men and women in the prescribing of secondary preventative therapies in primary care [2]. Little information is available regarding drug treatment in the elderly population (over 65 years) in Ireland, who constitute one-third of the General Medical Services scheme (GMS) population nationally, and consume almost double the national average cost of medicine [3]. Also there is a poor evidence base for such prescribing. The aim of this study was to examine the extent to which preventative cardiovascular therapies (i.e. statins, beta-blockers) are prescribed to the elderly compared with other cardiovascular treatments, and to determine whether a gender or age bias exists in such prescribing, in particular in those at high risk with (i) IHD and (ii) diabetes.

Methods

The study population was identified using a national primary care prescribing database, the GMS database. The GMS scheme in Ireland is a means tested scheme providing free medical care for all those eligible (~31% of the Irish population) and has been described in detail previously [4].

We examined the prescription database (using the WHO Anatomical Therapeutic Classification [5]) from the Eastern Region Health Authority (ERHA; population of 334,031, or 28% of the total GMS) from January–December 2001. A total of 117,225 patients were identified (45,602 male; 71,623 female) who had received a prescription for any of the cardiovascular medications listed below over the 12-month period. Patients were subdivided into three age groups; 65–69 years, 70–74 years and over 75 years.

Results

Table 1 gives the age and gender adjusted ORs for the prescribing of all cardiovascular therapies. All cardiovascular therapies are significantly more likely to be prescribed to male patients, with the exception of diuretics. All therapies from the total cohort we examined the number of patients who received any prescription for a vasodilator (ATC code C01, such as nitrates), diuretic (C03), beta-blocker (C07), calcium channel antagonist (C08), agents that act on the renin-angiotensin system (C09), cholesterol lowering therapies (C10) and aspirin (N02BA01 + B01AC06). Logistic regression analysis was used to determine the odds ratios (ORs) for these medications for females compared with males (females as reference), as well as the younger age category compared with the older age category (over 75 years; 65–69 year olds as reference). The ORs were adjusted for the effect of age or gender, respectively.

We also examined trends in prescribing of secondary preventative therapies in this elderly cohort within this 12-month period. From the total elderly cohort, those with IHD were identified (n = 9,124; 7.8% of the total; male:female 4,461:4,663) by the prescription of both a nitrate (C01DA) and aspirin (N02BA01 + B01AC06) in the same month. We also identified a subgroup of individuals with diabetes (n = 6,626; 5.6% of the total; male:female 3,179:3,447), who had received a prescription for a drug used to treat diabetes (A10). This subgroup did not include those using diet alone to control their diabetes, or those using diagnostic kits. Using these subgroups we then identified those patients who received a prescription for a beta-blocker, calcium channel antagonist, ACE inhibitor, angiotensin receptor blocker, statin or a fibrate. Control subjects were classified as those patients not having IHD or diabetes, respectively. SAS statistical software package (Version 8) was used. Significance at P < 0.05 was assumed throughout the study.
are significantly more likely to be prescribed in the over 75 year olds compared with 65–69 year olds, with the exception of beta blockers and cholesterol-lowering therapy, which were less likely to be prescribed.

For the subset of patients identified as having (i) IHD and (ii) diabetes, the adjusted ORs for prescribing of secondary preventative therapies are given in Table 2. Male patients with IHD are significantly more likely to receive a prescription for an ACE inhibitor, whereas female patients with IHD are significantly more likely to receive a prescription for an angiotensin receptor blocker. The over 75 year olds were significantly less likely to receive a prescription for a beta blocker, a statin and a fibrate than the 65–69 year olds. Female patients with diabetes were significantly more likely to receive a prescription for a statin than male patients with diabetes. The over 75 year olds were significantly less likely to receive a prescription for a statin than the 65–69 year olds.

### Discussion

The findings of this study indicate a gender and age variation in the prescribing of preventative cardiovascular medications to elderly patients, including those with established IHD (secondary prevention) and diabetes.

In the three age groups examined (65–69, 70–74 and over 75 year olds) we found that patients aged >75 years were less likely to receive cholesterol lowering therapy or a beta blocker than younger patients. As Williams et al. have reported previously [2], the reduced prescription of beta blockers in the elderly may possibly be explained by a higher prevalence of chronic obstructive airway disease. The reduced prescription of cholesterol lowering therapy could simply be due to less preventative therapy being prescribed to the over 75 year olds. Statins reduce the risk of ischaemic heart disease by ~30% and are recommended for patients at >3% annual risk of the disease. Since over 75 year olds are more likely to be in this high-risk category, many would probably benefit from taking statins. With the more recent publication of the Heart Protection Study [6] and the PROSPER study [7], which included patients up to the age of 80 years, a reversal of this trend is expected in the coming years. The increased prescription of diuretics to the over 75 year olds (OR = 2.04; 1.96–2.11) could reflect more congestive cardiac failure (CCF) in this age category.

Our results also show a trend towards increased cardiovascular prescribing in men. It is not clear why this is the case, but this may be related to the lower incidence of cardiovascular disease in women.

In the cohort of IHD patients we found that male patients were more likely to receive an ACE inhibitor (OR = 1.21; 1.11–1.32) and female patients were more likely to receive an angiotensin receptor blocker (OR = 0.64; 0.53–0.78). A limitation of the data is the lack of specific diagnosis and, therefore, it is difficult to ascertain why prescribing follows such a trend in male and female patients. One explanation is that female patients tend to suffer from ACE inhibitor-induced cough more often than men, and therefore are more likely to be prescribed angiotensin receptor blockers.

We also found that IHD patients aged >75 years were less likely to receive a statin (OR = 0.34; 0.31–0.39), a beta blocker (OR = 0.57; 0.51–0.64) or a fibrate (OR = 0.21; 0.11–0.43), suggesting that, as previously noted [2], age is a factor in the use of medication. In addition, current treatment guidelines for statins stipulate an age limit of <75–80 years if the patient’s life expectancy is not otherwise limited by debility or other disease [8], and as such GPs may exhibit caution when treating elderly patients. This could also be true for the decrease observed in fibrate prescribing, but a more probable explanation may be the fact that statins have replaced fibrates as the most heavily used cholesterol-lowering medications.

In the cohort of diabetic patients we found that female patients were more likely to receive a prescription for a statin (OR = 0.80; 0.72–0.89) than their male counterparts, and again, that those aged over 75 were less likely to receive a prescription for a statin (OR = 0.45; 0.39–0.51). The reason for the age difference is probably as explained earlier. Female patients with diabetes tend to be prescribed statin therapies more often than their male counterparts, perhaps because of the higher risk of cardiovascular disease in women with diabetes [9], which would explain the gender differential found in this study.

Our study has limitations however. While the GMS population (>1 million) comprising just over a third of the

### Table 2. Adjusted odds ratios (for age and gender) and 95% confidence intervals for the prescription of beta-blockers, calcium channel antagonists, ACE inhibitors (ACEI), angiotensin receptor blockers (ARBs), statins and fibrates in elderly patients identified as having (i) IHD and (ii) diabetes

<table>
<thead>
<tr>
<th>Drug class (ATC classification)</th>
<th>Gender</th>
<th>Age band</th>
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<td></td>
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<td>(95% CI)</td>
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<td>(95% CI)</td>
<td>(95% CI)</td>
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<tr>
<td>Salt (C10AA)</td>
<td>0.87 (0.81–0.97)*</td>
<td>0.80 (0.72–0.89)**</td>
<td>0.34 (0.31–0.39)**</td>
<td>0.45 (0.39–0.51)**</td>
<td>0.42 (0.38–0.46)**</td>
<td>0.51 (0.45–0.58)**</td>
</tr>
<tr>
<td>Beta blockers (C07)</td>
<td>1.03 (0.95–1.12)</td>
<td>1.02 (0.91–1.14)</td>
<td>0.57 (0.51–0.64)**</td>
<td>0.83 (0.71–1.00)</td>
<td>0.63 (0.57–0.70)**</td>
<td>0.79 (0.69–0.90)*</td>
</tr>
<tr>
<td>Calcium channel antagonists (C08)</td>
<td>1.03 (0.95–1.12)</td>
<td>0.87 (0.78–0.97)*</td>
<td>0.86 (0.77–1.00)</td>
<td>1.04 (0.91–1.19)</td>
<td>0.90 (0.82–1.00)</td>
<td>0.96 (0.85–1.08)</td>
</tr>
<tr>
<td>ACEI (C09A + C09B)</td>
<td>1.21 (1.11–1.32)**</td>
<td>1.04 (0.94–1.14)</td>
<td>0.99 (0.89–1.12)</td>
<td>0.78 (0.69–0.88)</td>
<td>1.03 (0.93–1.13)</td>
<td>0.77 (0.69–0.86)*</td>
</tr>
<tr>
<td>ARBs (C09C + C09D)</td>
<td>0.64 (0.53–0.78)**</td>
<td>0.82 (0.67–1.01)</td>
<td>0.83 (0.64–1.07)</td>
<td>0.66 (0.51–0.86)</td>
<td>0.79 (0.64–1.00)</td>
<td>0.62 (0.49–0.79)*</td>
</tr>
<tr>
<td>Fibrates (C10AB)</td>
<td>1.32 (0.72–2.42)</td>
<td>1.004 (0.64–1.58)</td>
<td>0.21 (0.11–0.43)**</td>
<td>0.39 (0.22–0.67)*</td>
<td>0.58 (0.26–1.31)</td>
<td>0.57 (0.32–1.00)</td>
</tr>
</tbody>
</table>

*Reference category. *P* < 0.05, **P* < 0.0001, ***P* < 0.01.
Irish population, cannot be regarded as representative of the general population, as socially disadvantaged persons, children and the elderly are over-represented, they do receive approximately 70% of all medicines prescribed in Irish general practice. With this, we identified a large population sample (117,225) taken from three counties around the greater Dublin area, giving us good statistical power and generalisability. Also the relatively high specificity of nitrate and aspirin prescribing [10] means that the majority of patients prescribed nitrate and aspirin therapy together do indeed have established IHD.

To conclude, the fact that variations in prescribing of such preventative treatment exists is unsurprising given that people aged 75 and older (most of whom are women) have been excluded from the large clinical trials and are significantly underrepresented in the evidence base used to determine clinical effectiveness [11], which may influence a prescriber’s perception of benefit and harm. It is for this reason that GPs may be cautious in the treatment of vascular disease in this age group but such undertreatment will have a much greater impact than in a younger population.

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Conflicts of interest
None.

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Stroke—mortality datasets

SIR—Clinical indicators based on coded data submitted from hospitals have been published in England since 1997. Stroke mortality data have been publicly available since 1999/2000. These suggest variation in stroke mortality rates between hospitals. This study has been performed as there are doubts about the accuracy of the official statistics [1]. The official stroke mortality data has been compared with stroke register data for the same hospital.

The stroke patients admitted to Wirral Hospital between 1st April 1999 and 31st March 2001 were the subject of this study. The hospital has a well-established stroke service and has had a stroke register maintained by two stroke coordinator nurses since 1997. At the time of this study it was separate from the main hospital information system. The stroke coordinators were notified of all possible Stroke or Transient Ischaemic Attack (TIA) patients by the Bed Bureau staff, and by the nursing, therapy and medical staff in the A&E department and on the wards.

The initial stroke register assessments were performed before the end of the first working day after admission. Details of these possible stroke patients were kept on a paper record. The detailed stroke register data forms were completed for patients in whom the diagnosis of stroke was verified by the clinical team responsible for their clinical care. All patients were followed up at least weekly until either hospital discharge or death. Approximately 50% were discharged from a stroke service bed. The remainder were discharged from a general medical, elderly care or rehabilitation bed. Their details were later optically scanned from the stroke register data forms onto the computerised stroke register database usually after their discharge from hospital at the conclusion of their episode of care.

Clinical coding in Wirral Hospital is performed in a centralised department by clinical coders trained in the use of ICD10. They enter diagnostic codes on all discharged patients into the hospital’s information system. The choice of code for each patient episode is based on the diagnosis (or diagnoses) that appears on the electronic hospital