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Gender differences in the presentation and management of acute coronary syndromes: a national sample of 1365 admissions

Patient gender determines cardiac care

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Background Gender differences in presentation and management of acute coronary syndromes (ACS) are well established internationally. This study investigated differences in a national Irish sample.

Design Cross-sectional survey.

Methods All centres (N=39) admitting cardiac patients to intensive/coronary care provided information on 25 consecutive acute myocardial infarction patients and other ACS patients admitted concurrently (N=1365 episodes). Patient data was analysed in terms of those with prior ACS/revascularisation, and those without.

Results Men with prior established ACS/revascularisation were twice as likely to have received revascularisation procedures (coronary artery bypass graft or percutaneous coronary intervention) prior to admission when controlling for age, total cholesterol and insurance status (OR 1.97, 95% CI 1.18-3.29, p=0.011). No gender differences were seen in acute-phase reperfusion (OR 0.96, 95% CI 0.76-1.24, p>0.05) or anti-platelet therapy (OR 0.99, 95% CI 0.69-1.41, p>0.05). For patients with prior ACS/revascularisation, men were twice as likely to receive statins on discharge after adjustment for age and total cholesterol (OR 1.94, 95% CI 1.02-3.71, p=0.045).

Conclusions Women were treated differently to men. Fewer women with a positive history of ACS received revascularisation prior to current admission and fewer women were prescribed lipid-lowering medications on discharge. Acute phase hospital treatment was not gender determined. These findings have implications for secondary prevention in Ireland.

Key words Acute coronary syndrome; acute myocardial infarction; gender; Ireland; revascularisation

Abstract word count: 219

Introduction

Gender differences in the presentation and management of acute coronary syndromes (ACS) are well established internationally [1-3]. Previous research has reported that women present with different symptomatology and may subsequently be diagnosed differently [1;4]. Women admitted for ACS also have lower rates of prior revascularisation, both bypass surgery and percutaneous coronary intervention (PCI) [2;5]. During the acute phase of hospitalisation, there is evidence that women receive less reperfusion therapy [1]. The medications prescribed on discharge may vary by gender. The Euro Heart Survey of ACS demonstrated that women were less likely to receive anti-platelets, beta-blockers and statins on discharge, but more likely to receive diuretic medication [3].

Little is known about the current gender profile of treatment of ACS in Ireland. This study analysed gender differences in the presentation and management of a national cohort of suspected ACS patients admitted to intensive or coronary care units in all 39 Republic of Ireland hospitals providing such care.

Method

Sample/Participants

Hospitals

All Irish centres admitting suspected acute myocardial infarction patients to intensive/coronary care units (I/CCU) were invited and agreed to participate in the survey (N=39). Ethics committee approval was obtained from individual centres/areas as appropriate [6]. Data were collected in 2003.

Participants and Procedure

Suspected ACS patients admitted to intensive/coronary care were recruited. This included patients with an admission diagnosis of either acute myocardial infarction or unstable angina. All relevant staff were supplied with the consensus definition of ACS, which uses enzyme change as a marker for necrosis [7]. Participating hospitals audited hospital charts of all consecutive suspected ACS patients, until 25 suspected cases of acute myocardial infarction had been admitted to intensive/coronary care. A total of 1365 episodes were recruited for this survey (935 suspected acute myocardial infarction and 430 contemporaneously admitted suspected other ACS). Data were collected on demographic and past clinical history, risk factors, admission details, acute treatments given and discharge status. Data were also collected on time to treatment, and data collectors approached eligible patients for consent to participate in a follow-up survey (results reported separately).

Statistical analysis

Data were analysed using robust variance estimation methods with STATA/SE 8.0 to account for the clustering of patients within hospitals. Patients were grouped into two broad categories: those with a prior positive history of ACS or revascularisation (acute myocardial infarction, unstable angina or previous coronary artery bypass surgery or PCI – ACS/revascularisation group) (39%), and those without (61%). Logistic regression was conducted on each group to determine odds ratios (OR) for each event. Control variables were gender, age, having private insurance, and total cholesterol. Insurance was originally analysed as completely private cover,

State-provided secondary care cover, or State-provided primary and secondary care cover. However, Wald test analysis after logistic regression determined that both State-provided insurance groups were similar, and insurance was subsequently analysed as a dichotomous variable (i.e. having private health insurance or not). Due to significant gender differences in age, all data was age-adjusted, and data presented in tables was adjusted to age 65 years (to portray a 'typical' coronary patient).

Results

Baseline characteristics

Of the 1365 suspected ACS episodes, 386 (28%) were women. Mean age for men on intensive/coronary care admission was 63 years (std dev=13; range 20-100). Mean age for women, at 69 years (std dev=13, range 23-94) was significantly higher than that of men (t=8.7, p<.001). Baseline characteristics of the sample are shown in Table 1.

Table 1 about here

A higher total cholesterol (OR=1.30, 95% CI 1.12-1.51) and older age of admission (OR=1.03, 95% CI 1.02-1.05) were significant predictors of being admitted with suspected acute myocardial infarction as opposed to other ACS for men, but only age (OR=1.04, 95% CI 1.02-1.06) was a significant predictor of suspected acute myocardial infarction for women.

In terms of past history, women had a higher prevalence of hypertension (49% vs. 37%), lower prevalence of any type of coronary heart disease (38% vs. 45%), lower prevalence of prior acute myocardial infarction or prior ACS (14% vs. 23% and 33% vs. 39% respectively), and lower rates of prior revascularisation (10% vs. 19%)(i.e. significantly lower levels of bypass surgery (4% vs. 9%) and PCI (6% vs. 11%)). Overall, women were less likely to have established prior ACS/revascularisation (33% vs. 41%), and were less likely to be taking anti-platelet medication on index admission (34% vs. 44%).

Although women had a significantly lower prevalence of prior ACS, this did not account for all the variation in prevalence of prior revascularisation (PCI or bypass surgery). Using data from patients with prior ACS/revascularisation (39%), a logistic regression model showed that the odds of having had revascularisation prior to the current admission were statistically related to gender, age, private insurance status and total cholesterol level. Men with a history of ACS/revascularisation were almost twice as likely as women to have had a previous revascularisation when controlling for these other variables (OR 1.97, 95% CI 1.18-3.29, p=0.011). For every year increase in age, a 4% decrease in the likelihood of having prior revascularisation was seen (OR 0.96, 95% CI 0.93-0.98, p=0.001). For every mmol/l unit increase in total cholesterol patients were 27% less likely to have had revascularisation (OR 0.73, 95% CI 0.58-0.93, p=0.011). Patients with private health insurance were over twice as likely to receive revascularisation than those without (OR=2.02, 95% CI 1.29-3.19, p=0.003).

Results were similar when data for all invasive cardiac procedures were analysed (data not shown).

Overall, no gender differences were seen for prior anti-hypertensive medication use (OR 0.95, 95% CI 0.71-1.3, p>0.05) or for prior statin prescription (OR 1.18, 95% CI 0.93-1.48, p>0.05). For patients with prior ACS/revascularisation this finding was repeated: no differences for anti-hypertensive medication use (OR 1.03, 95% CI 0.61-1.74, p>0.05) or statin use (OR 1.02, 95% CI 0.69-1.49, p>0.05) by gender were seen on index admission.

Process of care and discharge details

The process of care received by gender is shown in Table 2.

Table 2 about here

No gender differences were seen in acute-phase reperfusion (thrombolysis or direct PCI) (OR 0.96, 95% CI 0.76-1.24, p>0.05) or acute anti-platelet therapy (OR 0.99, 95% CI 0.69-1.41, p>0.05).

There was no gender difference in age-adjusted mortality rates (OR 0.85, 95% CI 0.59-1.24, p>0.05). Similar percentages of men and women were discharged on anti-platelet (OR 1.11, 95% CI 0.8-1.54, p>0.05) and anti-hypertensive medications (OR 1.09, 95% CI 0.76-1.57, p>0.05). There were however gender differences for

lipid-lowering medication. The odds of being prescribed statins were 34% higher for men when controlling for age (OR 1.34, 95% CI 1.03-1.72, p=0.027), and 35% higher when controlling for both age and total cholesterol (OR 1.35, 95% CI 1.01-1.81, p=0.043). Translating these findings into a clinical example: a 65 year old woman with a total cholesterol level of 5 mmol/l had a 76% chance of being prescribed a statin on intensive/coronary care discharge. A man of the same age and cholesterol level had an 81% (a 5% higher) chance of being prescribed a statin on discharge.

Even women with prior ACS/revascularisation were also less likely to be prescribed statins on intensive/coronary care discharge than men with prior ACS/revascularisation, when controlling for age and total cholesterol level (OR=1.94, 95% CI 1.02-3.71, p=0.045). For a patient aged 65 with a total cholesterol level of 5 mmol/l, this translated to an 86% chance a man would be prescribed statins, but only a 77% chance that a woman would be. However, women without prior ACS/revascularisation on admission were just as likely to receive statins on discharge as were men with no past history, when controlling for age and total cholesterol level (OR=1.09, 95% CI 0.75-1.6, p>0.05).

Discussion

The present survey evaluated the treatment of suspected ACS patients on a national level. It highlighted that men and women were treated differently in certain key aspects of care. Differences in treatments received by gender were seen both before the current hospitalisation in patients with prior established coronary disease, and at discharge.

The first major finding in the current survey was that women with prior history of ACS/revascularisation were less likely to have received revascularisation prior to index admission. Men were almost twice as likely to have had prior revascularisation when controlling for age, private insurance status and total cholesterol level. Indeed, men were also almost twice as likely as women to have had any form of invasive cardiac treatment (data not shown). Differential treatment by gender occurred when deciding whether a patient should undergo invasive cardiac treatment, even though the patients had already previously entered the healthcare system. This data replicates international findings on prevalence of revascularisation rates between men and women [2-5;8;9]. It may be that the women in the present survey did not require revascularisation, as their underlying disease could differ significantly from their male counterparts [1;4]. Therefore, although women received differing levels of treatment, it may not have been suboptimal. However, this seems unlikely as data from those with a confirmed positive history of ACS/revascularisation were analysed. Older patients were also less likely to have received revascularisation.

In terms of prescribed medications, there were no differences between genders in the rate of anti-hypertensive or lipid-lowering medication prescription prior to the current admission. This parity was also reflected in the acute care of patients, with similar numbers of men and women receiving both reperfusion therapy and anti-platelet therapy during the current admission. This finding compares well against other surveys which have shown that women receive less acute reperfusion therapy than men [1;10].

On intensive/coronary care discharge, similar proportions of men and women were prescribed anti-platelet and anti-hypertensive medications (although women received more diuretic medications). The levels prescribed compare well with the Euro Heart Survey [3]. However, women were significantly less likely to be prescribed lipid-lowering medications. For patients aged 65 with a total cholesterol level of 5.0 mmol/l, this translated into a 5% decreased chance of being prescribed statins for women. This reflects a significant disadvantage for women in secondary prevention. Given that lipid-lowering therapy reduces coronary heart disease mortality for women [11], and that it is recommended that all coronary heart disease patients be prescribed lipid-lowering medication regardless of total cholesterol level [12], this finding is of concern. Interestingly, for those who had no prior ACS/revascularisation, women were just as likely as men to be prescribed statins. The differential treatment was only seen for women with a prior history of ACS/revascularisation. Reasons for this are unknown, and this aspect requires further research.

In relation to gender, the present results show that some aspects of international guidelines are being adhered to (in this case reperfusion guidelines), whereas other aspects (statin prescription) have yet to be fully implemented. These findings, along with the findings of other similar research, where discrepancies in treatments between genders are seen [1-5;8-10], need to be further discussed by Cardiology Societies at national and international level.

Conclusions

Overall, there is evidence of treatment bias in favour of men in this national sample of patients admitted to intensive/coronary care for suspected ACS. This is reflected in increased coronary interventions in men prior to the current acute admission, and in a higher rate of prescription of lipid-lowering medication on intensive/coronary care discharge. Encouragingly, there were no treatment differences in the acute phase of in-hospital treatment, with men and women receiving reperfusion and anti-platelet medications equally often. The extent to which these findings reflect differing onset patterns of coronary heart disease for men and women needs to be further investigated.

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Table 1: Baseline characteristics of sample (age-adjusted to 65 years) (% unless otherwise stated)

	Male (N=979)	**Female** (N=386)	**Total** (N=1365)
Percentage of sample	72	28***	100
Mean Age† - years (standard deviation)	63 (13)	69 (13)***	64 (13)
Suspected acute myocardial infarction	68	71	69
Private insurance	33	29	31
Previous risk factor history			
Positive family history of coronary heart disease	41	46	43
Any prior history of coronary heart disease	45	38*	43
Hypertension	37	49***	40
Established prior ACS/revascularisation	41	33**	39
History of acute coronary syndrome (ACS)	39	33*	37
Acute myocardial infarction	23	14**	20
Unstable angina	18	18	18
Any prior invasive cardiac treatment	19	10***	16
Revascularisation	18	9**	15
Percutaneous coronary intervention	11	6*	10
Bypass surgery	9	4**	7
Diabetes: Type I	3	4	4
Type II	10	9	10
Total cholesterol† (mmol/l) (mean)	4.8	5.0	4.9
Previous cardiovascular medications (%)			
Aspirin/anti-platelets	44	34*	41
Antihypertensives	45	46	45
ACE inhibitors	24	22	24
Beta-blockers	27	23	26
Calcium antagonists	6	10*	7
Diuretics	6	9	7
Statins	28	25	27

*p<0.05, **p<0.01, ***p<0.001; †, no age-adjustment; ACS, acute coronary syndrome; ACE, angiotensin converting enzyme

Table 2: In-hospital process of care by gender for total sample (age-adjusted to 65 years) (%)

	Male	Female	Total
Acute treatments (%)			
Aspirin/other anti-platelets	78	79	78
Reperfusion	30	32	30
I/CCU discharge cardiovascular medications†			
Aspirin/anti-platelets	91	90	91
Anithypertensives	89	88	89
Beta-blockers	70	67	69
ACE inhibitors	57	58	57
Diuretics	11	16**	12
Calcium antagonists	4	6	5
Statins	79	73*	77
I/CCU Discharge diagnoses			
Acute myocardial infarction	67	72	69
Unstable angina	19	14	17
Other cardiac	16	16	16
Non-cardiac	7	8	7
Mortality	4	5	4

*p<0.05, **p<0.01, ***p<0.001; †, for patients discharged from hospital alive; I/CCU, intensive/coronary care unit; ACE, angiotensin converting enzyme

Captions

Table 1: Baseline characteristics of sample (age-adjusted to 65 years) (% unless otherwise stated)

Table 2: In-hospital process of care by gender for total sample (age-adjusted to 65 years) (%)