

Sex Bias in the Management of Coronary Artery Disease in Quebec

ABSTRACT

This study tests the hypothesis that, given the absence of financial barriers to major coronary procedures in Quebec, women are as likely as men to undergo such procedures. The use of coronary procedures in 33 940 patients with ischemic heart disease, admitted during 1 year to 78 Quebec hospitals, was analyzed. The male-to-female age- and severity-adjusted odds ratios for the use of these procedures were 1.47 for diagnostic procedures, 1.38 for therapeutic procedures, and 1.26 for diagnostic and therapeutic procedures. These results suggest that differences in the use of coronary procedures by sex are influenced by factors other than financial accessibility. (*Am J Public Health*. 1994;84:1013-1015)

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Introduction

Recent studies have shown that in the United States, women with coronary artery disease are less likely than men to undergo major diagnostic and therapeutic procedures.^{1,2} This puzzling finding prompted us to examine the use of coronary procedures in Quebec hospitals to assess the magnitude of a possible sex bias. As elsewhere in Canada, there is free access to care in Quebec; therefore, there is no financial barrier as there could be in the United States. Given the absence of financial barriers, our hypothesis was that women are as likely as men to undergo major coronary procedures, after adjustment for severity.

Methods

To test this hypothesis, we used the MED-ECHO hospital discharge abstract database (Quebec, Canada). The analysis included all 33 940 patients with ischemic heart disease (*International Classification of Diseases*, ninth revision³ [ICD-9] codes 410, 411, 413, 414) admitted during the administrative year 1989/90 to the 78 Quebec hospitals with 100 or more acute-care beds. A distinction was drawn between diagnostic procedures (coronary angiography and cardiac catheterization) and therapeutic procedures used for revascularization (percutaneous transluminal coronary angioplasty and coronary artery bypass graft). Logistic regression analyses were performed to relate the use of coronary procedures to predictors including sex, age (<50, 51-60, 61-70, 71-80, and >80 years), diagnosis (myocardial infarction vs other ischemic heart disease), and the Charlson index of comorbidity.⁴ The Charlson comorbidity index ranges from 0 to 24, a higher score indicating a heavier burden of comorbid disease.

Results

Summary statistics are presented in Table 1. Of the 33 940 patients, 66.32% were male. The women were older than the men and scored higher on the comorbidity index. A total of 7935 patients

(23.4%) had coronary angiography or cardiac catheterization, and 5983 patients (17.6%) underwent percutaneous transluminal coronary angioplasty or coronary artery bypass graft. Both diagnostic and therapeutic procedures were performed at the same time in 1850 patients (5.5%). Age and comorbidity were inversely associated with the presence of either diagnostic or therapeutic procedures. The presence of myocardial infarction strongly reduced the likelihood of diagnostic and therapeutic procedures.

Tables 2 and 3 show, respectively, crude and case mix-adjusted relative risks for the use of coronary procedures. The bivariate and multivariate estimations are similar: women were less likely than men to be treated aggressively. However, once a diagnostic procedure was performed, there was no difference between men and women in the use of revascularization. Therefore, we tried to refine the analysis of the use of diagnostic procedures. Logistic models including interaction terms between sex and other variables and terms testing for nonlinearity in the logit of the dependent variable were evaluated. The interaction between age and comorbidity was found to be the only significant term. The effect of age appeared to be nonlinear: older patients were much less likely to undergo diagnostic procedures than were younger patients (for patients aged 61-70, 71-80, and >80 years in comparison with patients younger than 50 years, the relative odds were, respectively, 1, 0.60, and 0.11). In all models, the association between sex and the use of diagnostic procedures remained strongly significant.

Finally, we assessed the outcomes of care in relation to the use of coronary

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TABLE 1—Characteristics of Patients with Ischemic Heart Disease, Quebec, 1989/90

	Men (n=22508)	Women (n=11432)
Diagnosis, ^a %		
410	34.37	35.49
411	10.47	12.74
413	24.18	27.94
414	30.98	23.84
Age, %		
< 50 y	20.24	7.41
51–60 y	26.39	15.36
61–70 y	31.39	30.90
71–80 y	16.95	30.62
> 80 y	5.03	15.71
Charlson comorbidity index level, %		
0	62.63	51.44
1–2	27.63	33.15
3–4	7.21	11.83
5–6	1.78	2.43
> 6	0.75	1.15
Alive, %	94.12	89.45

^aInternational Classification of Diseases, Ninth Revision, codes.³

procedures (Table 4). The overall mortality of women was higher than the mortality of men, but this difference disappeared when only patients who underwent a therapeutic procedure were considered. On this subject, we must note that the accuracy of fit of logistic models, measured by the area under the receiver operating characteristic curve,^{5,6} was higher for the prediction of death (about 0.86, a level as good as can be reached by models with clinical data⁷) than for the prediction of use of coronary procedures (0.67 or less).

Analyses performed separately on low-risk patients (age < 70 years and comorbidity index = 0) and high-risk patients (age > 70 years and comorbidity index > 1) led to the same results: women with coronary disease were less likely than men to undergo coronary procedures.

Discussion

The differences between men and women in the use of coronary procedures are striking. Our results show that physicians' decisions to perform diagnostic procedures vary nonlinearly according to the age of patients, as if an implicit cutoff were present. Patients' preferences may explain this result. For example,

TABLE 2—Unadjusted Male-to-Female Relative Risks for the Use of Coronary Procedures

	Relative Risk	95% Confidence Interval
Angiography	1.66	1.55, 1.79
Catheterization	1.51	1.43, 1.60
Angiography or catheterization	1.58	1.51, 1.65
Revascularization	1.53	1.45, 1.61
Diagnostic and therapeutic procedures	1.48	1.34, 1.64

TABLE 3—Adjusted Male-to-Female Odds Ratios for the Use of Coronary Procedures

	Odds Ratio	95% Confidence Interval
Catheterization or angiography	1.47	1.38, 1.57
Revascularization	1.38	1.29, 1.48
Revascularization once a diagnostic procedure has been performed	0.93	0.82, 1.06
Diagnostic and therapeutic procedures	1.26	1.13, 1.41
Percutaneous transluminal coronary angioplasty (vs coronary artery bypass graft)	0.69	0.61, 0.78

TABLE 4—Adjusted Male-to-Female Odds Ratios for Death from Ischemic Heart Disease

	n	Odds Ratio	95% Confidence Interval
Total sample	33 940	0.89	0.81, 0.97
With revascularization	5 983	0.81	0.55, 1.20
With no revascularization	27 957	0.89	0.81, 0.98

older patients with ischemic heart disease are possibly more often widowed or alone, a factor that may deter them from seeking aggressive care.^{8,9} However, age does not completely account for the differences between the sexes. Physicians may believe that diagnostic procedures are more risky in women and that the subsequent benefit of performing revascularization is smaller for women than for men. Physicians' decisions seem to depend on the patient's sex instead of his or her clinical status. However, given the poor fit of logistic models that predict procedure use, the clinical context that allows physicians to appropriately prescribe coronary procedures may not be grasped by such variables as age and comorbidity.

With regard to the higher mortality of women, it seems that although it is less

frequent, ischemic heart disease is more severe in women than in men. Women may be referred for coronary surgery at a more advanced stage of disease than are men.¹⁰

We do not know whether coronary procedures are underused in women and overused in men, because it was not possible to assess the appropriateness of these procedures. Therefore, physicians should readjust the management of coronary disease in both women, who may not be undergoing beneficial procedures, and men, who may be undergoing procedures that are not beneficial. However, we are inclined to favor the hypothesis that coronary procedures are underused in women, given women's higher mortality, which is interpreted here as a referral bias.

Since our results are nearly identical to what was found in the United States,^{1,2} they suggest that sex differences in the use of coronary procedures are not influenced by factors such as health services organization or financial accessibility. □

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ABSTRACT

To determine factors associated with health insurance coverage among persons with acquired immunodeficiency syndrome (AIDS), we interviewed 1958 persons 18 years of age or older who were reported to have AIDS in 11 states and cities. Overall, 25% had no insurance, 55% had public insurance, and 20% had private insurance. Factors associated with lack of insurance varied by current employment status. Employed persons with an annual household income of less than \$10 000 were 3.6 times more likely to lack insurance than employed persons with a higher income. Unemployed persons diagnosed with AIDS for less than 1 year were two times more likely to lack health insurance than unemployed persons diagnosed for a longer time. Making insurance available to persons identified as most likely to lack insurance should improve access to care for persons with AIDS. (*Am J Public Health.* 1994;84: 1015-1018)

Health Insurance Coverage among Persons with AIDS: Results from a Multistate Surveillance Project

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Introduction

Access to and use of health care services are affected by insurance status.¹⁻⁵ Increasingly, coverage for acquired immunodeficiency syndrome (AIDS) cases is shifting to public insurers, such as Medicaid,⁶ most likely resulting from loss of private insurance among persons with AIDS⁷⁻⁹ and demographic shifts in populations affected by the human immunodeficiency virus (HIV) epidemic.^{10,11} To describe insurance coverage among persons with AIDS, we used information from a multistate interview project.

Methods

Eleven state and local health departments are collaborating with the Centers for Disease Control and Prevention (CDC) in the Supplement to HIV/AIDS Surveillance project. This project expands information routinely collected via AIDS surveillance through personal interviews of persons with AIDS. Persons reported with AIDS who are 18 years of age or older and are medically able to complete

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