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Do socioeconomic factors modify the association between preoperative antidepressant use and survival following coronary artery bypass surgery?☆,☆☆

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ABSTRACT

Background: The impact of socioeconomic factors on mortality in patients with depression and cardiovascular disease is unknown. The aim was to study if socioeconomic factors modified the association between preoperative depression and survival following CABG.

Methods: In a nationwide population-based cohort study, 22,930 patients who underwent CABG in Sweden between 2006 and 2013 were included from the SWEDEHEART register. The national Prescribed Drug Register was used to ascertain preoperative antidepressant use which was utilized as a proxy for depression. Educational level, income, and civil status were extracted from the Longitudinal integration database for health insurance and labor market studies. The primary outcome measure was all-cause mortality and was ascertained from the Cause of Death register. Cox regression and propensity score methods were used to estimate the risk for death while controlling for differences in baseline characteristics.

Results: During a mean follow-up of 4.1 years, 340 (11%) patients died in the antidepressant group and 1923 (9.7%) patients died in the control group. The adjusted risk for death was higher in patients with preoperative antidepressant use (HR 1.27; 95% CI 1.13–1.43), and was practically unchanged after the addition of educational level, family disposable income, and civil status (HR 1.25; 95% CI 1.11–1.41). The results were confirmed in a propensity-score matched cohort, and in selected subgroup analyses.

Conclusions: Among patients who underwent CABG in Sweden, preoperative antidepressant use was associated with worse survival even after controlling for socioeconomic factors. The clinical implication is that the impact of depression on mortality was not influenced by socioeconomic factors.

1. Introduction

Depression is an established risk factor for cardiovascular morbidity and mortality [1] in patients with coronary artery disease. Moderate to severe depression before coronary artery bypass grafting (CABG) is an indicator of worse long-term survival [2]. It has been suggested that there is a link between socioeconomic status (SES) and depression [3]. Socioeconomic status was significantly associated with the incidence of cardiovascular disease [4]. Lower SES is associated with a high burden of cardiovascular risk factors, and may have an impact on prognosis [5]. A Danish study showed that lower income was significantly associated with worse survival after stroke [6]. Although access to health-care is publicly financed in Sweden, social inequalities are likely to affect prognosis in patients with cardiovascular disease, but prior studies are limited by a lack of information regarding SES. Little is known about the impact of SES in relation to depression and survival after CABG. We performed a nationwide population-based cohort study to investigate if the independent association between preoperative antidepressant use and survival persisted irrespective of SES. The aim was to study if socioeconomic factors modified the association between preoperative antidepressant use and survival following CABG.

2. Methods

The study complied with the Declaration of Helsinki and was approved by the regional Human Research Ethics Committee, Stockholm, Sweden. The need for informed consent was waived.

☆ Clinical Trial Registration Information—http://clinicaltrials.gov Identifier: NCT02276950.
☆☆ All authors take responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation.

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Table 1
Baseline characteristics in 22,930 patients who underwent primary isolated CABG in Sweden 2006–2013 in relation to antidepressant use.

		Antidepressant use		
	All patients	No	Yes	p-Value
Number of patients	22,930	19,852	3078	
Age, years, mean (SD)	67.4 (9.2)	67.7 (9.1)	65.9 (9.7)	<0.001
Female sex	4558 (19.9%)	3547 (17.9%)	1011 (32.8%)	<0.001
Birth region				<0.001
Nordic countries	20,452 (89.2%)	17,846 (89.9%)	2606 (84.7%)	
Other	2478 (10.8%)	2006 (10.1%)	472 (15.3%)	
Body mass index (kg/cm^2)				<0.001
1st tertile (lowest)	6960 (33.4%)	6117 (33.9%)	843 (30.3%)	
2nd tertile	6947 (33.3%)	6054 (33.5%)	893 (32.1%)	
3rd tertile	6924 (33.2%)	5882 (32.6%)	1042 (37.5%)	
Diabetes mellitus	6202 (27.0%)	5199 (26.2%)	1003 (32.6%)	<0.001
Hypertension	10,513 (45.8%)	8953 (45.1%)	1560 (50.7%)	<0.001
Hyperlipidemia	5856 (25.5%)	4965 (25.0%)	891 (28.9%)	<0.001
Peripheral vascular disease	2334 (10.2%)	1947 (9.8%)	387 (12.6%)	<0.001
Chronic pulmonary disease	1881 (8.2%)	1486 (7.5%)	395 (12.8%)	<0.001
eGFR (mL/min/1.73 m^2)				0.34
>60	17,863 (81.4%)	15,504 (81.6%)	2359 (80.4%)	
45 to 60	2609 (11.9%)	2231 (11.7%)	378 (12.9%)	
30 to 45	937 (4.3%)	812 (4.3%)	125 (4.3%)	
15 to 30	191 (0.9%)	169 (0.9%)	22 (0.7%)	
<15[a]	334 (1.5%)	284 (1.5%)	50 (1.7%)	
Prior myocardial infarction	12,911 (56.3%)	11,099 (55.9%)	1812 (58.9%)	0.002
Prior PCI	4389 (19.1%)	3691 (18.6%)	698 (22.7%)	<0.001
Heart failure	2290 (10.0%)	1924 (9.7%)	366 (11.9%)	<0.001
Stroke	2067 (9.0%)	1661 (8.4%)	406 (13.2%)	<0.001
Atrial fibrillation	1399 (6.1%)	1218 (6.1%)	181 (5.9%)	0.58
Left ventricular ejection fraction				0.33
>50%	15,989 (70.6%)	13,870 (70.8%)	2119 (69.5%)	
30 to 50%	5660 (25.0%)	4866 (24.8%)	794 (26.0%)	
<30%	992 (4.4%)	856 (4.4%)	136 (4.5%)	
Alcohol dependency	595 (2.6%)	391 (2.0%)	204 (6.6%)	<0.001
Cancer	1549 (6.8%)	1297 (6.5%)	252 (8.2%)	<0.001
Education				0.55
<10 years	9291 (41.2%)	8014 (41.0%)	1277 (42.1%)	
10–12 years	8981 (39.8%)	7788 (39.9%)	1193 (39.3%)	
>12 years	4295 (19.0%)	3729 (19.1%)	566 (18.6%)	
Civil status				<0.001
Married	15,132 (66.0%)	13,253 (66.8%)	1879 (61.0%)	
Not married	3163 (13.8%)	2702 (13.6%)	461 (15.0%)	
Divorced	3651 (15.9%)	3048 (15.4%)	603 (19.6%)	
Widowhood	984 (4.3%)	849 (4.3%)	135 (4.4%)	
Family disposable income (quintiles)				<0.001
Q1 (lowest)	4587 (20.0%)	3812 (19.2%)	775 (25.2%)	
Q2	4585 (20.0%)	3920 (19.7%)	665 (21.6%)	
Q3	4586 (20.0%)	4002 (20.2%)	584 (19.0%)	
Q4	4586 (20.0%)	4016 (20.2%)	570 (18.5%)	
Q5	4586 (20.0%)	4102 (20.7%)	484 (15.7%)	

Data are n (%) unless otherwise noted.
eGFR = estimated glomerular filtration rate, PCI = percutaneous coronary intervention, SD = standard deviation.
[a] This category includes patients on preoperative dialysis.

2.1. Study population data sources

In this nationwide population-based cohort study we identified all patients who underwent CABG in Sweden between 2006 and 2013 from the SWEDEHEART (Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies) register [7,8]. Patients were excluded if they had undergone previous cardiac surgery or had concomitant procedures in addition to CABG or if they underwent surgery within 24 h of decision to operate. As described in our previous studies [9,10], the study database was created by the Swedish National Board of Health and Welfare by linking the unique Swedish personal identity number [11] with the SWEDEHEART register, The National Patient Register [12], The Prescribed Drug Register and the Cause of Death register. Information about baseline patient characteristics was extracted from SWEDEHEART, and from the Swedish National Patient Register (Swedish National Board of Health and Welfare). The International Classification of Diseases codes for comorbid conditions are listed in Supplemental Table 1. Survival status was ascertained in March 2014 from the Cause of Death register. The cause of death was available until December 31, 2012 (Supplemental Table 2). To identify patients with antidepressant use before surgery, we used the national Prescribed Drug Register [13] (Anatomical Therapeutic Chemical [ATC] code N06A, except for the following substances: N06AX02 and N06AX12). Preoperative antidepressant use was defined as having had at least one dispensed antidepressant prescription before the date of surgery.

Table 2
Event rates and relative risks for all-cause mortality in 22,930 patients who underwent primary isolated CABG in Sweden 2006–2013 in relation to antidepressant use.

	Antidepressant use	
	No	Yes
Events/person-years	1923/82,063	340/11,040
Incidence rate per 1000 person-years (95% CI)	23.4 (22.4–24.5)	30.8 (27.7–34.3)
	Hazard ratio (95% CI)	
Unadjusted model	1.00	1.33 (1.19–1.50)
Age and sex adjusted model	1.00	1.51 (1.34–1.69)
Multivariable adjusted model	1.00	1.27 (1.13–1.43)
Multivariable adjusted model[a] + SES	1.00	1.25 (1.11–1.41)
Multivariable adjusted model[a] + SES + PS	1.00	1.25 (1.11–1.41)
Multivariable adjusted model[a] + SES and stratified by PS quintiles	1.00	1.26 (1.12–1.43)

CI = confidence interval, PS = propensity score, SES = socioeconomic status (education, income, civil status).
[a] The model was adjusted by all variables in Table 1.