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Impact of new-onset postoperative depression on readmission outcomes after surgical coronary revascularization



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ABSTRACT

Background: Depression affects between 10% and 40% of cardiac surgery patients and is associated with significantly worse outcomes. The incidence and impact of new-onset depression beyond acute follow-up remain ill-defined. The present study aimed to evaluate the incidence, risk factors, and prognostic implication of depression on 90-d readmission rates after coronary artery bypass grafting (CABG) surgery.

Methods: A retrospective cohort study was performed identifying adult patients without prior depression who underwent CABG surgery using the 2010-2014 National Readmissions Database. CABG patients who were readmitted more than 2 wk but within 90 d of discharge were categorized based on the presence of new-onset depression. Association between the development of new-onset depression and rehospitalization were morbidity, mortality, costs, and length of stay (LOS) and were examined using multivariable regression.

Results: During the study period, 1,001,945 patients underwent CABG. Of these, 11.7% of patients were readmitted after 14 d but within 90 d of discharge with 5.1% of these patients having a diagnosis of new-onset depression. Postoperative new-onset depression was not associated with increased readmission morbidity, costs, or LOS. Mortality in new-onset depression readmissions was 1.2%, compared with 2.3% in all readmitted patients ($P = 0.014$). Depression was associated with lower odds of mortality ($OR = 0.56$, $P = 0.02$).

Conclusions: New-onset depression following CABG discharge was not associated with increased odds of mortality, morbidity, costs, or increased LOS on readmission. Rather, new-onset depression is associated with decreased odds of readmission mortality. Overall, CABG readmissions are decreasing, whereas the rate of new-onset depression is slightly

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increasing. Implementation of routine depression screening tools in postoperative CABG care may aid in early detection and management of depression to enhance postoperative recovery and quality of life.

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Introduction

Hospital readmission rates are used as independent indicators for quality of care across many health care disciplines.^{1,2} As bundled payments for coronary artery bypass grafting (CABG) surgery become a reality in the new paradigm of value-based health care delivery, reimbursement will be affected by unplanned rehospitalizations. Readmission after CABG is associated with worse outcomes and increased costs of care.³ Identification of risk factors for readmission and specific patient populations at elevated risk would allow for implementation of comprehensive multidisciplinary approaches to provide better care for these patients. In addition to the traditional risk factors for readmission such as age and functional status,⁴ depression has been thought to predispose cardiac patients to unplanned reshospitalization.⁵

Depression in patients who have undergone CABG surgery has been identified as an independent risk factor for hospital readmission and cardiac morbidity and mortality. Affecting up to 40% of patients in this group,⁶ depression is also associated with decreased quality-of-life scores and increased per capita health care costs.⁷ The existing body of literature has primarily examined the impact of pre-existing depression and its impact on clinical endpoints. However, few studies have examined the relationship between the diagnosis of new-onset postoperative depression in CABG patients and the associated impact on morbidity and mortality. The present study was performed to examine the prevalence of new-onset depression among patients who were rehospitalized following CABG within 90 d and to characterize the clinical outcomes and resource utilization among this cohort.

Methods

The Healthcare Cost and Utilization Project (HCUP) National Readmission Database (NRD) was used to obtain patient discharge and readmission information after CABG. The NRD database includes an estimated 36 million discharges per year from >2000 hospitals across 21 states, representing 49.3% of total US hospitalizations. National estimates were performed by using weighted adjustments provided by the HCUP. Clinical information such as primary and secondary diagnosis, costs, length of stay (LOS), mortality, discharge location, and other patient demographics are included in the database.

The study cohort included all adults (>18 y) who were discharged after CABG operations between January and September of each year during 2010-2014. For those who were readmitted after 2 wk, the minimum duration necessary to establish a diagnosis of depression and within 90 d of discharge were categorized based on the presence of new-onset depression. Readmitted without depression (RND) and

readmitted with depression (RWD). The following ICD-9 codes were used: 36.11-36.16 (to identify CABG procedures) and 311, 296.20-296.25, 296.30-296.35 (diagnoses of depression). We excluded all patients who did not survive to discharge or carried a diagnosis of depression at the index admission. To allow for potential 90-d follow-up on all patients, discharges after September 30 were not included in our analysis.

Pearson's chi-squared analysis of survey-weighted data was performed for categorical variables, and Student's t-tailed test was used for continuous measures in Stata 14 (StataCorp LLC, College Station, TX). Multivariable logistic regression was performed to assess the predictors of mortality and morbidity (defined as any one systemic or local complication) during a rehospitalization encounter for the total cohort of patients readmitted after 14 d but within 90 d of CABG discharge, including new diagnosis of depression as a covariate. Separate multivariable analyses of the subgroup of RWD patients were performed to identify factors that increase odds of in-hospital mortality or morbidity. The Charlson Comorbidity Index, a previously validated composite index of 30 common comorbid conditions, was used in risk adjusted analyses.^{8,9} Overall and new-onset depression readmission rates were adjusted for age and tested for trend significance using modified Cochran-Armitage analyses. For all analyses, $P < 0.05$ was considered significant. This study was deemed exempt from review by the institutional review board at the University of California, Los Angeles. A data use agreement with the HCUP was completed.

Results

During the study period, an estimated 1,001,945 patients underwent CABG surgery without a prior diagnosis of depression. The overall 14- to 90-d rehospitalization rate after discharge from index CABG hospitalization was 118.69% (858,689), with 5.1% of these readmissions (4347) carrying a new diagnosis of depression. These patients received a new diagnosis of depression at the time of discharge from their readmission hospitalization. On average, the RWD cohort was younger (66.3 versus 67.5 y, $P < 0.0001$), more likely to be female (41.5% versus 31.9%, $P < 0.0001$), longer unadjusted index LOS (13.1 versus 14.8 d, $P < 0.0001$), and higher total index hospitalization cost (\$50,622 versus \$54,431, $P < 0.0001$) compared with the RND cohort, as shown in Table 1. The RWD cohort was also less likely to be admitted for elective index operations and were more commonly discharged to skilled nursing facility (SNF) than the RND group (Table 2). There was no significant difference in the reported income quartile or insurance payers between the two groups.

After adjusting for patient and hospital characteristics, female gender (OR = 1.8, 95% CI 1.6-1.9), discharge to SNF (OR 2.5, 95% CI 2.3-2.8), surgical complications (OR 1.1, 95% CI 1.0-

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