Geriatric Mental Health Care 3 (2015) 7–11

Contents lists available at ScienceDirect

Geriatric Mental Health Care

journal homepage: www.elsevier.com/locate/gmhc

Research Paper

Mental disorder comorbidity and in-hospital mortality among patients with acute myocardial infarction

Minji Sohn [a,c,*], Daniela C. Moga [a,b], Jeffery Talbert [a]

[a] College of Pharmacy, University of Kentucky, 789 South Limestone Street, Lexington, KY 40536, USA
[b] Department of Epidemiology, College of Public Health, University of Kentucky, 111 Washington Avenue, Lexington, KY 40536, USA
[c] Department of Pharmaceutical Sciences, College of Pharmacy, Ferris State University, 220 Ferris Drive, Big Rapids, MI 49307, USA

ARTICLE INFO

Article history:
Received 9 December 2014
Received in revised form
26 February 2015
Accepted 14 April 2015
Available online 27 April 2015

Keywords:
Acute myocardial infarction
Healthcare Cost and Utilization Project
Mental disorder comorbidity
In-hospital mortality

ABSTRACT

Objective: The purpose of this study was to examine the association between mental disorder comorbidity and in-hospital mortality, and whether subgroups of mental disorder comorbidity have differential impacts on in-hospital mortality in acute myocardial infarction (AMI) patients.
Methods: A cross-sectional study was conducted using the 2010 Nationwide Inpatient Sample (NIS) database of the Healthcare Cost and Utilization Project (HCUP). The study sample included discharges for which the primary diagnosis was AMI. As the primary exposure, the presence of any mental disorder comorbidity was identified as discharges for which one or more mental disorders listed as the non-primary diagnosis. The secondary exposure was subgroups of the mental disorder comorbidity (schizophrenia, major affective disorder, substance abuse, and other). The outcome of interest was in-hospital mortality. Logistic regression and resulting odds ratios (ORs) with associated 95% confidence intervals (CIs) were used to estimate the impact of mental disorder comorbidity on in-hospital death.
Results: A total of 42,416 discharges were included in the analysis. Of these, 16,140 (38%) had at least one diagnosis of a mental disorder. No significant differences were observed in in-hospital mortality between patients with and without mental disorder comorbidity. However, when the mental disorder comorbidity is specified into subgroups, the impact differentiated depending on the subgroup. More specifically, patients with schizophrenia were associated with increased in-hospital mortality (OR 1.72, 95% CI 1.02–2.90) and patients with substance abuse disorder were associated with decreased in-hospital mortality (OR 0.80, 95% CI 0.70–0.91). Major affective disorder and other mental disorders were not statistically significant.
Conclusions: Mental disorder comorbidity has a differential impact on post-AMI in-hospital mortality depending on the subgroup of mental disorders. We argue that mental disorder comorbidity should not be treated as a single category when assessing its impact on a health outcome.

1. Introduction

During the past decades, the mortality following acute myocardial infarction (AMI) has declined (Smolina et al., 2012). This is likely due to the more effective treatment in the acute phase of myocardial infarction with the introduction of coronary care units (Khush et al., 2005; Gil et al., 1999) and the early treatment based on comorbid conditions associated with AMI mortality (Davies and Ghosh, 2001; Malmberg et al., 1995; Wilcox et al., 1988; Morrison et al., 2000). However, despite these efforts, AMI remains the leading cause of death worldwide.

Among comorbid chronic conditions, mental disorder comorbidity is particularly important because of its high association with other risk factors that deteriorate health outcomes. For example, persons with mental disorders have higher rates of cardiovascular disease risk factors such as smoking, alcohol consumption, and obesity (Davidson et al., 2001; Allison et al., 1999; Ucok et al., 2004; Cassidy et al., 1999). However, the clinical significance of the mental disorder comorbidity associated with short-term or long-term mortality is not yet conclusive since findings of previous studies are mixed. Plomondon et al. (2007) found no significant difference in risk-adjusted one year all-cause mortality between acute coronary syndromes (ACS) patients with and without severe mental illness. On the other hand, Lawrence et al. (2003) observed higher rate of death (time to death not specified) caused by ischemic heart disease in psychiatric patients. While different study designs and study settings may have resulted in such inconsistent findings, many studies reported only the aggregate impact of mental disorder comorbidity. Considering that there are inherent differences between mental disorders with respect to psychological/neurological mechanism or prognosis, the implication of mental disorder

* Corresponding author at: Department of Pharmaceutical Sciences, College of Pharmacy, Ferris State University, 220 Ferris Drive, Big Rapids, MI 49307, USA. Tel.: +1 231 591 2239.
E-mail address: minjisohn@ferris.edu (M. Sohn).

http://dx.doi.org/10.1016/j.gmhc.2015.04.002
2212-9693/

comorbidity assessment based on its aggregate impact could be still limited.

Therefore, the purpose of this study was to examine the association between mental disorder comorbidity and in-hospital mortality, and whether subgroups of mental disorder comorbidity have differential impacts on in-hospital mortality in AMI patients.

2. Methods

2.1. Data source and study sample

A cross-sectional study was conducted using 2010 Nationwide Inpatient Sample (NIS) database of the Healthcare Cost and Utilization Project (HCUP). The NIS approximates a 20% stratified sample of U.S. community hospitals located in those states participating in HCUP. In 2010, data from 45 states were included in NIS and these states comprised over 96% of the U.S. population. The study sample included discharges for which the primary diagnosis was acute myocardial infarction (ICD-9-CM; 410.XX). This approach was used to focus on those with acute myocardial infarction (AMI), not those who had AMI condition secondary to other events, such as survey or hypotension (Ani et al., 2010).

2.2. Outcome and exposure

The outcome of interest in this paper was in-hospital mortality defined based on discharges described as dead. As the primary exposure in this study, the presence of current mental disorder comorbidity was identified using discharge diagnosis for which one or more mental disorders (ICD-9CM; 295.00–319.99) listed as the non-primary diagnosis. Organic psychotic conditions (ICD-9-CM; 290.00–294.99) such as dementia and delirium were excluded from the comorbid mental conditions because they are considered as a medical cause and are shown to be uniquely associated with the high rates of mortality (Druss et al., 2000; Zubenko et al., 1997). As the secondary exposure, comorbid mental disorders were grouped by four categories using diagnosis at discharge: (1) schizophrenia (ICD-9-CM; 295.XX), (2) major affective disorders which include uni- and bipolar disorders (ICD-9-CM; 296.XX), (3) substance abuse and dependence disorders (ICD-9-CM; 303.XX–305.XX), and (4) other mental disorders.

2.3. Confounders

Patient demographics including age, sex (male or female), and race (white, black, Hispanic, Asian, American Indian, or other) were adjusted in the analysis. Also, median household income by ZIP code, primary payer source, admission type, and Charlson comorbidity index were included in the analysis.

Patient age was categorized into six groups (age ≤ 40, 41–50, 51–60, 61–70, 71–80, and ≥ 81). The median household income quartiles for patient's ZIP code were: (1) $<$ \$39,000; (2) \$39,000–49,999; (3) \$48,000–\$62,999; and (4) $\geq$ \$63,000. The primary payer source for the discharge included Medicare, Medicaid, private insurance, self-pay, no charge, or other. Medicare is a US government funded health insurance program to provide health care coverage to individuals aged 65 years or older and those with disabilities and/or end-stage renal disease. Medicaid is also a government funded health insurance program for those with low-income in the US. The type of admission was defined as emergency room, urgent admission, elective admission, trauma center, or no information available. Also, in order to control for other comorbidities, Charlson comorbidity index was used (Deyo et al., 1992). While dementia was excluded when identifying mental disorder comorbidity, it was included when computing Charlson comorbidity index. Also, it should be noted that as another Charlson comorbidity index diagnostic category, acute myocardial infarction is applied to the entire study population in this paper. Therefore, every observation in this paper had the Charlson comorbidity index of one or greater.

In our dataset, 1.4% ($n=598$) of race, 0.2% of primary payer source ($n=76$), and 2.1% ($n=903$) of median household income quartiles for patient's ZIP code were missing values. These missing values were included in the logistic regression analysis as an additional category to examine whether it was significantly associated with the dependent variable.

2.4. Statistical analysis

The sample characteristics were analyzed and compared by mental disorder comorbidity status using chi-squared test since all the variables included in this paper were categorical. Logistic regression and resulting odds ratios with associated 95% confidence intervals were used to estimate the impact of mental disorder comorbidity on in-hospital death. As the primary exposure, the impact of any mental disorder comorbidity compared to no mental disorder comorbidity was estimated first, and then another separate multivariate logistic regression analysis was conducted using the variables of four subgroups of mental disorder comorbidity and no mental disorder comorbidity. The second analysis was intended to examine whether the subgroups of mental disorders have differential impact on the study outcome. Statistical analyses were performed using STATA version 12 (STATA Corp., Texas, USA).

3. Results

A total of 42,416 discharges with AMI were included in the analysis. Of those, a total of 16,140 (38%) had at least one diagnosis of a mental disorder as non-primary diagnosis. In the mental disorder comorbidity group, 715 (4%) died in hospital. Of the 26,276 comparison group, 1607 (6%) died in hospital (Table 1).

Compared to individuals without mental disorder comorbidity, those with mental disorder comorbidity were likely to be younger as the mean age was 63 in the mental disorder comorbidity group and 70 in the comparison group. For the sex distribution, the mental disorder comorbidity group consisted of a slightly lower proportion of female patients than the comparison group. Also, the mental disorder comorbidity group included a higher percentage of black and white patients, and lower percentage of Hispanic and Asian patients. For the primary payer source, Medicare took up the largest percentage in both groups. However, those with mental disorder comorbidity were more likely to have Medicaid or pay out-of-pocket compared to those without mental disorder comorbidity. Also, the average median household income was lower for mental disorder comorbidity group. A lower percentage of the mental disorder comorbidity group was admitted to the hospital through emergency rooms or urgent admissions compared to the comparison group. As a comorbidity indicator, the two groups were not significantly different in the Charlson comorbidity index categories of 2–4, but the significantly lower proportion of the category 5 or greater was observed in the mental disorder comorbidity group.

The multivariate logistic regression model including the variable of any mental disorder comorbidity is shown in Table 2. In the analysis, mental disorder comorbidity was not a statistically significant factor predicting in-hospital mortality (OR 0.92, 95% CI 0.84–1.01). The in-hospital mortality significantly increased with age, having the highest rate of in-hospital mortality observed in those with age ≥ 81 (OR 6.03, 95% CI 3.91–9.32). Patient sex and race were not significantly associated with the outcome, except that Hispanic patients were more likely to die in hospital when compared to white patients (OR 1.19, 95% CI 1.02–1.40). With respect to the primary payer source, those with