



## Examining the impact of comorbid serious mental illness on rehospitalization among medical and surgical inpatients<sup>☆,☆☆</sup>



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### ABSTRACT

**Objective:** Multiple barriers to quality health care may affect the outcomes of postacute treatment for individuals with serious mental illness (SMI). This study examined rehospitalization for medical and surgical inpatients with and without a comorbid diagnosis of SMI which included psychotic disorders, bipolar disorder and major depression. **Methods:** We examined hospital discharge records for medical and surgical inpatients from a large urban health system. Descriptive statistics and logistic regression models compared 7-, 30-, 60-, 90- and 180-day rehospitalization among medical and surgical inpatients with SMI ( $n = 3221$ ) and without an SMI diagnosis ( $n = 70,858$ ). **Results:** Within 6 months following discharge, hospitalized *medical* patients without an SMI diagnosis (34.3%) and with an SMI diagnosis (43.4%) were rehospitalized ( $P < .001$ ), while *surgical* patients without an SMI diagnosis (20.3%) and with an SMI diagnosis (30.0%) were rehospitalized ( $P < .001$ ). Odds of rehospitalization among medical patients were 1.5 to 2.4 times higher for those with an SMI diagnosis compared to those without an SMI diagnosis ( $P < .001$ ).

**Conclusions:** Medical patients with a comorbid psychotic or major mood disorder diagnosis have an increased likelihood of a medical rehospitalization as compared to those without a comorbid SMI diagnosis. These findings support prior literature and suggest the importance of identifying targeted interventions aimed at lowering the likelihood of rehospitalization among inpatients with a comorbid SMI diagnosis.

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### 1. Introduction

Persons with serious mental illness (SMI) face lifelong challenges in psychological and social functioning that frequently co-occur with compromising physical health conditions. However, owing to a complex interplay of personal, provider and system factors, these persons have diminished access to quality medical care that is continuous, comprehensive and coordinated across levels of the care continuum as compared to the general population [1]. These persons, similar to other populations with multiple comorbidities and psychosocial barriers such as older adults, are at disparate risk for further decline at a critical period, namely, in transitioning to the community after an acute medical or

surgical hospitalization. During and after a general medical hospital stay, owing to the complexity of need, poorly integrated care systems and lack of support structures, persons with comorbid SMI diagnoses are likely susceptible to costly failures in proper follow-up in outpatient settings, medication management, treatment adherence and self-care. These challenges may increase their risk for rehospitalization due to recurrences or worsening of prior problems, the onset of new medical problems or the emergence of complications related to the original acute episode [2–5].

With the advent of the Affordable Care Act (ACA), rehospitalization after an episode of acute care became a key indicator of less than optimal, costly and poorly coordinated health care [6,7,8]. This is evident in the ACA's implementation of initiatives to significantly reduce rehospitalization through payment penalties that incentivize coordination of care across transitions to outpatient treatment, especially for high-risk groups [9]. Among these initiatives is the Medicare Hospital Readmissions Reduction Program which outlines financial disincentives for hospitals with excessive all-cause medical or surgical rehospitalization for patients with a select set of high-risk diagnoses. Although SMI diagnoses are not currently included in the initiative, the program is expected to expand to include other high-risk groups [10].

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The relationship between mental illness comorbidity and medical rehospitalization has been previously studied in a number of contexts. Prior research suggests that comorbid psychiatric illness among medical inpatients with cardiovascular disease, pneumonia and diabetes is associated with rehospitalization within 30 days of discharge and beyond [6,10–13]. A few studies more specifically examined the impact of a comorbid SMI diagnoses on subsequent medical rehospitalization for patients with specific chronic health conditions, such as diabetes. For example, in one study, acute care patients with diabetes were more likely to be rehospitalized within 30 days if they had a comorbid bipolar or psychotic disorder, and this increased risk carried through the 24-month study time frame [13]. Another study examined cohorts of inpatients using longitudinal data and demonstrated over a 4-year period that rehospitalization was associated with a comorbid SMI diagnosis defined as co-occurring mood disorders (bipolar disorder, major depression or dysthymia), or substance abuse among diabetic inpatients. Most recently, in a Danish sample [14,15], persons with a comorbid diagnosis of schizophrenia and major depression were associated with increased risk for rehospitalization for ambulatory care-sensitive conditions or those disorders that usually do not require inpatient care.

This existing research on the association between a comorbid SMI diagnosis and rehospitalization has restricted analyses to patients with particular medical conditions and thus did not examine the broad population of hospital patients with heterogeneous medical or surgical needs. To address this gap in the literature, the current study uses medical record data to examine the impact of a comorbid SMI diagnosis on rehospitalization for both medical and surgical patients at multiple time intervals posthospitalization. This study examined the primary hypothesis that after controlling for a range of demographic and clinical characteristics, a comorbid SMI diagnosis among medical and surgical inpatients will be associated with a significantly higher risk for rehospitalization as compared to other patients without these comorbid SMI diagnoses.

## 2. Materials and methods

Hospital records were used from January 1, 2011, through December 31, 2013, for patients admitted to three general hospitals, all within the same large urban health system. Analyses examined rehospitalizations considering the impact of a comorbid SMI diagnosis; demographic characteristics, including age, gender, race, marital status and primary insurance status; and clinical characteristics, including specific hospital, admission source, discharge disposition, type of admission, length of stay, primary diagnosis and medical comorbidities. The study design and procedures were approved by the University of Pennsylvania Institutional Review Board.

### 2.1. Sample

Index hospitalizations included the first, index, medical or surgical hospitalization among admitted patients after January 1, 2012. Hospitalizations were included only if there was 12 months of look-back to capture patient characteristics and 6 months looking forward to capture rehospitalization. Thus, all index hospitalizations were between January 1, 2012, and June 30, 2013. Among these hospitalizations ( $N = 111,180$ ), patients were selected if admitted for a primary medical or surgical condition [categorized by the All Patient Refined–Diagnostic Related Group (APR-DRGs)]. Patients admitted for a primary psychiatric diagnosis, those admitted for a primary or secondary diagnosis of dementia, those admitted for obstetrics and chemotherapy, those under the age of 18 or over the age of 100, those who died in the hospital and those discharged within 24 h of admission or left against medical advice were excluded from the sample. We chose to exclude patients with very short stays (less than 24 h) or those leaving against medical advice because clinically they would be difficult to engage in a future interventional strategy

aimed at reducing rehospitalization. After these exclusions, our study sample included 74,079 patients.

### 2.2. Construction of serious mental illness, rehospitalization and covariates

*Serious mental illness* (SMI) is defined in the Federal Register as a significant and chronic impairment in major domains resulting in persistent problems with cognition, mood and life functioning [16]. As such, this study operationally defined SMI to encompass comorbid diagnoses of schizophrenia, bipolar disorder and major depression. This definition of SMI has also been used in other studies examining SMI and subsequent medical rehospitalization [17,18]. Using a 12-month look-back from the index hospitalization, we identified patients who had a comorbid SMI diagnosis using the Agency for Healthcare Research and Quality multilevel clinical classification system (CCS) and included those with a diagnosis of CCS 5.8.1-bipolar disorders [*International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes: 296.00–296.99], CCS 5.10-schizophrenia and other psychotic disorders (ICD-9-CM codes: 293.81, 293.82, 295.01–295.95, 29700.0–298.0) and CCS 5.8.2-major depressive disorder (ICD-9 codes: 296.20–296.36) [6], yielding 70,858 without a comorbid SMI diagnosis and 3221 patients with a comorbid SMI diagnosis. Among those with a comorbid SMI diagnosis, 12.1% ( $n = 384$ ) had a diagnosis of major depression, 38.2% ( $n = 1207$ ) had a diagnosis of schizophrenia, and 49.7% ( $n = 1572$ ) had a diagnosis of bipolar disorder.

All-cause medical/surgical rehospitalization included hospitalizations for a primary medical or surgical diagnosis (hospitalizations for a psychiatric diagnoses or dementia were excluded) that occurred within 7, 30, 60, 90 or 180 days postdischarge. The construction of the variable does not assume that the rehospitalization was for the medical or surgical issue addressed in the index hospitalization. A binary variable was created for each time period. Hospitalizations in these time periods designated as “planned” admissions such as chemotherapy or cardiovascular procedures were excluded.

Covariates were selected based on review of the existing literature on health outcomes among hospitalized patients but were constrained by available data in the medical record. APR-DRGs were used to classify the index primary medical or surgical diagnosis. Variables were also constructed for hospital (A, B or C), age, gender, race, marital status, insurance status and clinical characteristics including admission source (routine, emergency room, outpatient, rehabilitation/long-term care and other institution) and discharge disposition (routine, home health care, skilled nursing/hospice/long-term care and other), and length of stay in days for both medical and surgical admissions. We used the Charlson comorbidity index (excluding depression) [19] to classify co-occurring medical disorders as a marker of illness severity.

### 2.3. Statistical analyses

Descriptive analyses compared demographic and clinical characteristics of patients with and without a comorbid SMI diagnosis using  $\chi^2$  and  $t$  tests by each covariate and by rehospitalization at 7, 30, 60, 90 and 180 days. Unadjusted and adjusted logistic regression models examined the impact of a comorbid SMI diagnosis on rehospitalization at 7, 30, 60, 90 and 180 days for each type of index hospitalization (medical and surgical). Adjusted models controlled for hospital, demographic and clinical covariates; length of stay; Charlson comorbidities and DRG. In order to reduce the probability of type I error associated with running five logistic regression models, an alpha of .01 (i.e., .05 divided by 5) was selected as the a priori level of significance. All analyses were performed using Stata v.11.

## 3. Results

Tables 1 and 2 describe demographic and clinical characteristics of the sample for patients with and without a comorbid SMI diagnosis.

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