Outpatient Follow-Up Visits After Hospital Discharge for Mental Illness and Implications for Readmissions

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BACKGROUND AND OBJECTIVES
- Schizophrenia affects approximately 1% of adults (ie, approximately 2.4 million people) in the United States
- Symptoms of schizophrenia include positive symptoms (eg, hallucinations, delusions, and auditory or visual hallucinations) and negative symptoms (eg, anhedonia and apathy)
- Bipolar I disorder affects approximately 0.6% of people in the United States
- Schizophrenia affects approximately 1% of adults (ie, approximately 2.4 million people) in the United States

METHODS
Data Source
- This retrospective database analysis utilized data from the Optum Clinformatics database for calendar year 2011
- The Optum Clinformatics database consists of data from a single, large national managed healthcare plan, comprising 14.5 million lives

Patient Selection and Study Measures
- Patient selection and study measures were based on the analytic specifications of the American Medical Association (AMA), American Hospital Association (AHA), and medical claims analysis available from Janssen Scientific Affairs, LLC, that assesses treatment patterns and resource utilization among patients with a diagnosis of schizophrenia or bipolar I disorder

Patient Selection
- Two patient cohorts were identified for this analysis: schizophrenia (with or without diagnosed bipolar I disorder) and bipolar I disorder

Study Measures
- Study measures included demographic and clinical characteristics, such as age, presence of select conditions, diagnosis of other psychosis, use of psychotropic medication (eg, antipsychotics and antidepressants)
- The primary measure of interest was the analysis of the presence of claims for psychiatric follow-up visits post-hospitalization

Data Analysis
- Descriptive statistics (ie, mean, median, standard deviation for continuous measures; counts and proportions for categorical measures) were calculated for demographics
- A logistic regression analysis was undertaken to assess the effects of a 7-day outpatient follow-up visit on a likelihood of readmission, controlling for age, sex, substance abuse, other psychiatric, antipsychotic medication possession ratio (MPR), and use of anxiolytics, anticonvulsants, and mood-stabilizing drugs
- Antipsychotic MPR was defined as total number of days the patient received antipsychotic medication (excluding inpatient days) divided by the number of days in the time window

RESULTS
Patient Demographics and Clinical Characteristics
- 4,016 patients with schizophrenia and 20,111 patients with bipolar I disorder were identified
- The schizophrenia cohort had a mean (SD) age of 36.9 (±15.6) years, and 51.2% had a female sex
- The bipolar I disorder cohort had a mean (SD) age of 36.5 (±15.4) years, and 51.2% had a female sex

Table 1. Demographic and Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Schizophrenia</th>
<th>Bipolar I Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>36.9 ± 15.6</td>
<td>36.5 ± 15.4</td>
</tr>
<tr>
<td>Female sex</td>
<td>2,017 (48.5%)</td>
<td>10,206 (50.6%)</td>
</tr>
<tr>
<td>Male sex</td>
<td>2,005 (49.5%)</td>
<td>10,004 (49.4%)</td>
</tr>
<tr>
<td>Other sex</td>
<td>2 (0.1%)</td>
<td>2 (0.1%)</td>
</tr>
</tbody>
</table>

Patient Outcomes
- Among the mental health patient population, one standard HEDIS measure is the percentage of inpatient admissions who received a follow-up visit within 7 days of discharge from a mental hospitalization

Table 2. Multivariable Regression Predicting Likelihood of 30-Day Readmission Among Patients With a Psychiatric Hospitalization

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>0.46 (0.41-0.52)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>0.40 (0.31-0.51)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Bipolar I</td>
<td>0.40 (0.31-0.51)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

CONCLUSIONS
- Multicenter follow-up within 7 days after hospital discharge for mental illness was associated with statistically significant lower odds of 30-day readmission (schizophrenia: odds ratio [OR], 0.46; 95% CI, 0.41-0.52; p<0.0001; and bipolar I: OR, 0.40; 95% CI, 0.31-0.51; p<0.0001; and bipolar II: OR, 0.40; 95% CI, 0.31-0.51; p<0.0001)

LIMITATIONS
- This study was a retrospective analysis, and MPR was evaluated as a general patient characteristic over the course of follow-up. Results from the logistic regression do not suggest a temporal relationship between antipsychotic adherence and hospital readmission

REFERENCES
- Supported by Janssen Scientific Affairs, LLC
- Presented at the ISPOR 20th Annual International Meeting: May 16–20, 2015; Philadelphia, PA, USA
### BACKGROUND AND OBJECTIVES

#### Psychiatric Hospitalization and Follow-Up

- Over the 1-year analysis period, 43.2% of patients with a schizophrenia diagnosis experienced a psychiatric hospitalization, while 28.0% of bipolar I disorder patients experienced a psychiatric hospitalization.

#### Patient Selection

- Patients in the bipolar I disorder cohort must have met all of the following eligibility criteria: 
  - ≥ 1 inpatient or ≥ 2 outpatient claims with a diagnosis code for bipolar I (ICD-9-CM 295.00, 295.10, 296.20, 300.48) in the time window.
  - Presence of any antipsychotic medication in the time window.
  - Presence of any of antipsychotic medication in the time window.
  - Male 2,251 (54.1%) 7,649 (35.1%)
  - 18-34 1,766 (42.4%) 7,964 (36.6%)
  - 55-64 606 (14.6%) 3,020 (13.9%)
  - Age ≥ 65 missing at beginning of time window (10,082)

#### Study Measures

- Study measures included demographic and clinical characteristics, such as age, presence of inpatient hospitalizations, and utilization of mental illness treatments. Diagnoses were based on International Classification of Diseases (ICD-9-CM) codes for schizophrenia and bipolar I disorder.

### Data Analysis

- Descriptive statistics (ie, mean, median, standard deviation for continuous measures; counts and proportions for categorical measures) were calculated for demographics.

- Logistic regression analysis was undertaken to assess the effects of 7-day outpatient follow-up visit on likelihood of readmission, controlling for age, sex, substance abuse, other psychiatric, antipsychotic prescription possession (MPR), and use of antidepressants, anxiolytics, anticonvulsants, and mood-altering drugs.

- Antipsychotic MPR was defined as the total number of days the patient received antipsychotic medication (excluding inpatient days) divided by the number of days remaining in the period (ie, from start to end of data) after the first antipsychotic was dispensed.

### RESULTS

#### Patient Demographics and Clinical Information

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR 95% CI P-Value</th>
<th>OR 95% CI P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>2.56 (2.04-3.21) 0.00</td>
<td>2.56 (2.04-3.21) 0.00</td>
</tr>
<tr>
<td>Sex</td>
<td>2.01 (1.47-2.70) 0.00</td>
<td>2.01 (1.47-2.70) 0.00</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>0.69 (0.51-0.93) 0.02</td>
<td>0.69 (0.51-0.93) 0.02</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>1.35 (1.01-1.84) 0.04</td>
<td>1.35 (1.01-1.84) 0.04</td>
</tr>
<tr>
<td>Anxiolytics</td>
<td>1.11 (0.82-1.50) 0.53</td>
<td>1.11 (0.82-1.50) 0.53</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>1.02 (0.82-1.28) 0.82</td>
<td>1.02 (0.82-1.28) 0.82</td>
</tr>
<tr>
<td>Mood-altering drugs</td>
<td>0.87 (0.69-1.08) 0.20</td>
<td>0.87 (0.69-1.08) 0.20</td>
</tr>
</tbody>
</table>

#### Multivariate Analysis of Readmission

- Using a logistic regression, patients with follow-up within 7 days of discharge had a 57% lower odds of 30-day psychiatric readmission (OR, 0.63; 95% confidence interval [CI], 0.51-0.78) and bipolar I disorder (OR, 0.63; 95% CI, 0.51-0.78) patients, compared with patients who did not have follow-up within 7 days.

### CONCLUSIONS

- Outpatient follow-up within 7 days after hospital discharge for mental illness was associated with statistically significant reductions in psychiatric and bipolar disorder hospitalizations.

### REFERENCES


### Table 1. Demographic and Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Patient</th>
<th>15-34 45-64 ≥ 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>2.56 (2.04-3.21) 0.00</td>
<td>2.56 (2.04-3.21) 0.00</td>
</tr>
<tr>
<td>Sex</td>
<td>2.01 (1.47-2.70) 0.00</td>
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<tr>
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</tr>
</tbody>
</table>

### Table 2. Multivariate Regression Predicting Likelihood of 30-Day Readmission Among Patients With 1 Psychiatric Hospitalization

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR 95% CI P-Value</th>
<th>OR 95% CI P-Value</th>
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<tr>
<td>Age (years)</td>
<td>2.56 (2.04-3.21) 0.00</td>
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<tr>
<td>Sex</td>
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<td>Anticonvulsants</td>
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<td>Mood-altering drugs</td>
<td>0.87 (0.69-1.08) 0.20</td>
<td>0.87 (0.69-1.08) 0.20</td>
</tr>
</tbody>
</table>

### Table 3. Demographic and Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Patient</th>
<th>15-34 45-64 ≥ 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>2.56 (2.04-3.21) 0.00</td>
<td>2.56 (2.04-3.21) 0.00</td>
</tr>
<tr>
<td>Sex</td>
<td>2.01 (1.47-2.70) 0.00</td>
<td>2.01 (1.47-2.70) 0.00</td>
</tr>
<tr>
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<tr>
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<td>0.87 (0.69-1.08) 0.20</td>
</tr>
</tbody>
</table>
Psychiatric Hospitalization and Follow-Up

- Over the 1-year analysis period, 43.2% of patients with a schizophrenia diagnosis experienced a psychiatric hospitalization, while 23.8% of bipolar I disorder patients experienced a psychiatric hospitalization. (Figure 1)
- Among patients with ≥1 psychiatric hospitalization, 30.3% and 32.9% had outpatient follow-up visits within 7 days of discharge in the schizophrenia and bipolar I cohort, respectively.

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Table 1. Multivariate Regression Predicting Likelihood of 30-Day Readmission Among Patients With ≥1 Psychiatric Hospitalization

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥1 inpatient or ≥2 outpatient claims with diagnosis code for schizophrenia (ICD-9-CM 295.0X) in the time window</td>
<td>1.666 (1.495-1.854)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>≥1 inpatient or ≥2 outpatient claims with a diagnosis code for bipolar I (ICD-9-CM 295.1X, 295.2X, 295.3X, 295.4X, 295.5X) in the time window</td>
<td>1.337 (1.201-1.484)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>≥1 inpatient or ≥2 outpatient claims with a diagnosis code for bipolar II (ICD-9-CM 296.0X, 296.4X, 296.5X, 296.6X, 296.7, 296.8X) in the time window</td>
<td>1.380 (1.169-1.617)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Multivariate Analysis of Readmission

Using a logistic regression, patients with follow-up within 7 days of discharge had a 44.9% reduction in the odds of 30-day readmission compared with patients with no follow-up (HR 0.55, 95% CI 0.40-0.75, p = 0.001); and patients with follow-up within 7 days of discharge had a 22.0% reduction in the odds of 90-day readmission compared with patients with no follow-up (HR 0.78, 95% CI 0.62-0.99, p = 0.045) (Table 2).

CONCLUSIONS

- Outpatient follow-up within 7 days after hospital discharge reduces the risk of 30-day and 90-day readmissions among patients with ≥1 psychiatric hospitalization. Our findings indicate that shorter intervals between hospital discharge and first outpatient follow-up visits among patients with ≥1 psychiatric hospitalization may help reduce readmission rates.
- These findings have important implications for health plans and healthcare providers, particularly given recent policy initiatives aimed at reducing readmission rates.
- Consistent patient follow-up after discharge from a psychiatric hospitalization may help reduce readmission rates and have potential cost implications.

REFERENCES


Tables and figures

Table 1. Demographic and Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Patient With ≥1 Psychiatric Hospitalization</th>
<th>Patient With ≥1 Psychiatric Hospitalization ≥1 inpatient or ≥2 outpatient claims with diagnosis code for schizophrenia (ICD-9-CM 295.0X) in the time window</th>
<th>Patient With ≥1 Psychiatric Hospitalization ≥1 inpatient or ≥2 outpatient claims with a diagnosis code for bipolar I (ICD-9-CM 295.1X, 295.2X, 295.3X, 295.4X, 295.5X) in the time window</th>
<th>Patient With ≥1 Psychiatric Hospitalization ≥1 inpatient or ≥2 outpatient claims with a diagnosis code for bipolar II (ICD-9-CM 296.0X, 296.4X, 296.5X, 296.6X, 296.7, 296.8X) in the time window</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≤17</td>
<td>4,164 (40.0%)</td>
<td>2,251 (54.1%)</td>
<td>1,912 (55.3%)</td>
<td>1,216 (60.8%)</td>
</tr>
<tr>
<td>18-34</td>
<td>3,986 (95.7%)</td>
<td>2,017 (47.8%)</td>
<td>1,575 (47.2%)</td>
<td>994 (50.4%)</td>
</tr>
<tr>
<td>35-44</td>
<td>311 (7.5%)</td>
<td>146 (3.5%)</td>
<td>115 (3.4%)</td>
<td>69 (3.5%)</td>
</tr>
<tr>
<td>≥45</td>
<td>313 (7.8%)</td>
<td>160 (3.8%)</td>
<td>120 (3.5%)</td>
<td>71 (3.5%)</td>
</tr>
<tr>
<td>Minimum</td>
<td>7.0</td>
<td>18.0</td>
<td>18.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Median (IQR)</td>
<td>35.0 (22.0-50.0)</td>
<td>40.0 (29.0-50.0)</td>
<td>40.0 (29.0-50.0)</td>
<td>40.0 (29.0-50.0)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>3,940 (95.2%)</td>
<td>2,007 (47.5%)</td>
<td>1,557 (46.9%)</td>
<td>964 (49.1%)</td>
</tr>
<tr>
<td>Black</td>
<td>224 (5.4%)</td>
<td>100 (2.4%)</td>
<td>76 (2.2%)</td>
<td>46 (2.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>16 (0.4%)</td>
<td>8 (0.2%)</td>
<td>6 (0.2%)</td>
<td>3 (0.2%)</td>
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<tr>
<td>Hispanic</td>
<td>203 (4.9%)</td>
<td>95 (2.3%)</td>
<td>75 (2.2%)</td>
<td>44 (2.3%)</td>
</tr>
<tr>
<td>Insurance status</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Private</td>
<td>3,951 (95.2%)</td>
<td>1,996 (47.8%)</td>
<td>1,552 (46.8%)</td>
<td>961 (49.0%)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>211 (5.1%)</td>
<td>101 (2.4%)</td>
<td>76 (2.2%)</td>
<td>46 (2.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>12 (0.3%)</td>
<td>6 (0.1%)</td>
<td>4 (0.1%)</td>
<td>2 (0.1%)</td>
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<tr>
<td>Admission status</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Elective</td>
<td>3,181 (79.1%)</td>
<td>1,604 (38.4%)</td>
<td>1,244 (36.6%)</td>
<td>751 (38.4%)</td>
</tr>
<tr>
<td>Emergency</td>
<td>1,183 (29.1%)</td>
<td>492 (11.8%)</td>
<td>370 (11.0%)</td>
<td>245 (12.5%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>100 (2.4%)</td>
<td>46 (1.1%)</td>
<td>36 (1.0%)</td>
<td>24 (1.2%)</td>
</tr>
<tr>
<td>Readmission rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No readmission</td>
<td>3,994 (98.4%)</td>
<td>2,017 (47.8%)</td>
<td>1,575 (47.2%)</td>
<td>994 (50.4%)</td>
</tr>
<tr>
<td>1 readmission</td>
<td>51 (1.2%)</td>
<td>25 (0.6%)</td>
<td>21 (0.6%)</td>
<td>13 (0.7%)</td>
</tr>
<tr>
<td>≥2 readmissions</td>
<td>79 (1.9%)</td>
<td>42 (1.0%)</td>
<td>34 (1.0%)</td>
<td>22 (1.1%)</td>
</tr>
</tbody>
</table>