TEAM KENTUCKY

Cabinet *for* Health *and* Family Services
Office *of* Health Data *and* Analytics
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CHFS
Cabinet for Health and Family Services

Research Brief
Predictors of 30-Day Readmission in Adult Medicaid Beneficiaries
After a Hospital Discharge Associated with a Serious Psychiatric Diagnosis

What is Known on This Topic?

One of the most pronounced policy components of the Affordable Care Act is the way it has forced hospitals to focus on reducing the occurrence of unplanned re-admissions of their patients within 30 days after they have been discharged. Under this policy, hospitals face financial penalties for high rates of 30-day readmissions; as this is generally understood to be a measure of the quality of care provided during the inpatient admission.

Readmissions are disruptive and distressing for patients, burdensome to hospital operations, and costly to healthcare payers. Unfortunately, because of the debilitating nature of many psychiatric illnesses, patients with these disorders often struggle to manage their mental health – consequently requiring several episodes of inpatient hospital care. For this reason, patients with severe and persistent mental illness are among the highest risk for 30-day readmissions.

What Does this Project Add?

This study aimed to respond to research and policy questions for CHFS related to which patient characteristics are the strongest predictors of readmission after a hospital discharge. Analyses investigated the unique effects of the following variables on risk of readmission: (1) patient demographics (race, gender, rural/urban residence, age); (2) psychiatric diagnosis; (3) healthcare utilization (whether patients saw an ambulatory care provider or filled a prescription within 30 days after discharge), and; (4) comorbid medical conditions.

Introduction

State Medicaid programs are the primary payers for behavioral health services – especially those provided to the most vulnerable adults and children in the US. Moreover, these services often involve hospital care for acute psychiatric episodes, which all too frequently result in re-admissions for patients within 30 days of discharge. These readmissions are extraordinarily expensive for The Centers for Medicare and Medicaid Services. One study published in the New England Journal of Medicine estimated that the Medicare program spent $17.4 billion annually on unplanned re-hospitalizations in 2004.[1] In that study, roughly 1 in 4 Medicare patients admitted for psychosis were readmitted within 30 days.[1]

Kentucky's Medicare readmission rate – the most commonly reported-on payer source for this metric – is among the highest in the nation.[1] Furthermore, Kentuckians also report experiencing more frequent mental distress when compared to other states.[2]

Healthcare Spending & Hospital Care for Psychiatric Illness

Patients with psychiatric illness often require a high level of care, need care over an extended period of time, or (in many cases) both. Using federal healthcare spending data, a study of the most high-cost medical conditions discovered that, at $201 billion, mental disorders accounted for the single highest estimated annual spending.[3] Figure 1 is captured from this *Health Affairs* article by Charles Roehrig (2016), and shows how pronounced healthcare spending for mental disorders is for the institutionalized and active duty military population.[3]

Figure 1: *Top Ten Medical Conditions by Estimated Spending*

Ten medical conditions with the highest estimated spending in 2013
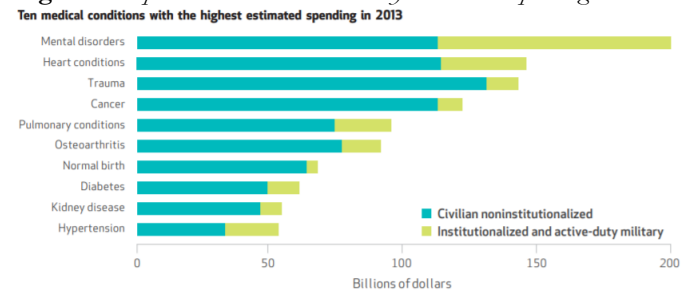
SOURCE Author's analysis of study data. NOTES Institutionalized populations include nursing home residents, long-term patients in psychiatric hospitals, and prisoners. Trauma is fractures and wounds. Pulmonary conditions include chronic obstructive pulmonary disease, asthma, and other pulmonary diseases.

Found in Roehrig (2016)

The literature on hospital readmissions also offers several important insights about which patients are at the greatest risk for readmission. In a study published by the *Journal of the American Medical Association*, researchers associated with Harvard University found that, among elderly Medicare recipients, Black patients were more likely than White patients to be readmitted within 30 days after hospitalization for three of the most common medical conditions related to hospitalization in the US. These were: Acute Myocardial Infarction (AMI), Congestive Heart Failure (CHF), and Pneumonia, and this difference between groups was related to both a patient's race and to the site where care was received.[4]

This racial dynamic has also been observed in hospital admissions for psychiatric conditions.[5] One study used Medicaid claims to investigate these relationships. This study noted that: (1) males were more likely than females to readmit; (2) Black patients were more likely than White patients to readmit; (3) patients with psychotic disorders were the most likely to readmit, and; (4) patients who were seen by a Community Mental Health Center after discharge were less likely to readmit.[5]

Study Method

Kentucky Medicaid claims data from calendar year 2019 were used to conduct these analyses. Claims related to the provision of care for children were excluded from this study – meaning our results should be understood to only describe adult patients.

Claims data was included if it met the following criteria: (1) the claim was for an inpatient hospital stay; (2) the claim contained an ICD-10 code for at least one of a set of common psychiatric diagnoses within the first five lines of the claim (suggesting that the mental health condition was a significant reason for the admission); (3) claims for a subsequent inpatient admission that occurred within 30 days of a discharge and also contained one of these ICD-10 codes were considered to be re-admissions. Bivariate statistics and logistic regression were then performed to investigate associations between patient demographic variables and measures of health service utilization and rates of 30-day readmission.

Results

These inclusion criteria identified 24,256 hospital admissions from 20,385 unduplicated Medicaid beneficiaries in 2019. Of these, there were 2,984 readmissions – 12.3% of all hospitalizations. Among these admissions, 43.4% were for a Substance Use Disorder, 8.3% were for Schizophrenia/psychosis, 34.9% were for a Mood Disorder, and 13.4% were for an Anxiety, Adjustment or Somatoform Disorder. These analyses did not specifically highlight or describe the effects of dual-diagnoses (i.e., substance use plus another primary psychiatric condition). Table 1 displays the results of bivariate analyses.

Table 1. Patient Characteristics and 30-Day Hospital Readmission Rates

Variable	Hospitalization Resulted in a Readmission?		Bivariate Statistic
	No (n = 21,272)	Yes (n = 2,984)	
Sex[a]			X^2 = 121.9
Female	12,014 (89.8%)	1,365 (10.2%)	p < 0.001
Male	9,258 (85.1%)	1,619 (14.9%)	
Age	38.5 years	38.9 years	t = -1.8 p = 0.071
Racial Category			
Unknown	239 (89.2%)	29 (10.8%)	
Black	2,400 (87.7%)	338 (12.3%)	X^2 = 3.995
White	18,341 (87.6%)	2,588 (12.4%)	p = 0.407
Latinx	91.4%[b]	8.6%[b]	
Asian	89.4%[b]	10.6%[b]	
Rurality Code[a,c]			
Rural	1,867 (90.9%)	186 (9.1%)	X^2= 74.242
Urban	12,376 (88.7%)	1,968 (13.7%)	p < 0.001
Suburban	7,008 (89.5%)	823 (10.5%)	
Psychiatric Diagnosis[a]			
Substance Use Disorders	9,239 (87.8%)	1,284 (12.2%)	
Schizophrenia/ Psychoses	1,604 (79.2%)	420 (20.8%)	X^2 = 213.239
Mood Disorders	7,414 (87.6%)	1,047 (12.4%)	p < 0.001
Anxiety, Somatoform, & Adjustment Disorders	3,015 (92.8%)	233 (7.2%)	
Medical Comorbidity			X^2 = 26.284
No	15,211 (88.4%)	1,998 (11.6%)	p < 0.001
Yes	6,061 (86.0%)	986 (14%)	
Patient Followed Up with CMHC[a]			
No	17,735 (89.0%)	2,181 (11%)	X^2 = 188.343
Yes	3,537 (81.5%)	803 (18.5%)	p < 0.001
Patient Followed Up with Ambulatory Care[a]			X^2 = 217.631
No	10,383 (91.0%)	1,027 (9.0%)	p < 0.001
Yes	10,889 (84.8%)	1,957 (15.2%)	

[a]Statistically significant
[b]Count is suppressed to protect confidentiality
[c]28 hospitalization claims contained unknown RUCC codes

Conclusions

Taken together, the results of bivariate statistics and the logistic regression model revealed a set of pertinent conclusions related to behavioral health services in Kentucky. In terms of statistically significant differences in the logistic regression model:

(1) *males were 1.43 times as likely to readmit as females*;
(2) *urban dwellers were 1.85 as likely to readmit as rural dwellers*;
(3) *Black beneficiaries were 0.85 as likely to readmit as White beneficiaries*;
(4) *those admitted for Schizophrenia or other psychoses were 1.62 times as likely to readmit as those admitted for Substance Use Disorder*;
(5) *those with medical comorbidities (sepsis, heart failure, COPD, Acute Myocardial Infarction, Diabetes, Pneumonia) were 1.29 times as likely to readmit as those without a comorbid diagnosis, and*;
(6) *those who received care from a Community Mental Health Center (CMHC) within the first 30 days after discharge were 1.19 times as likely to readmit as those who did not receive such care during that same period.*

These findings are broadly consistent with past research, with some notable exceptions. As noted earlier, a past analysis by Mark and colleagues[5] found that Black Medicaid beneficiaries were more likely to readmit within 30 days than White patients. Contrary to those results, our anlayses estimate that – when holding several confounding variables constant – White patients were more likely to readmit than Black patients. We also found that recieveing care from a CMHC increased rather than decreased the odds of readmission. Importantly, there were significant differences in the methodology of the Mark et al. study and this one (we did not require continuous enrollment, we analyzed patient-level data vs. hospital-level data, etc.).

There have been multiple studies that have aimed to identify which patient characteristics best predict readmission amongst those with psychiatric disorders.[6] These studies have varied in their conclusions; including a debate regarding whether readmission rates are, in fact, a valid metric for the quality of hospital care for patients with psychiatric diagnoses. These analyses should be interpreted in light of their limitations. Primarily, our investigation did not include a consideration for hospital length of stay – a variable that some scholars have noted as an important predictor of readmission.[6]

References

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Appendix
Predictors of 30-Day Readmission in Medicaid Beneficiaries
After a Hospital Discharge Associated with a Serious Psychiatric Diagnosis

Receiving a service from a CMHC after discharge *increased* the odds of readmission. This is contrary to past research. What explains this finding?

It is unclear why beneficiaries who received a service from a CMHC were more likely to readmit within 30 days than their peers who did not utilize a CMHC in the 30 day period following hospital discharge. One of the primary aims of CMHC's is to keep their clients well in the community, and, by extension, prevent hospitalization amongst patients with psychiatric diagnoses. This being said, CMHC's also serve psychiatric populations that are frequently: (1) more severely impaired by their illness; (2) more likely to live in poverty and homelessness; (3) less likely to have robust networks of social support. Each of these are documented correlates of increased risk for readmission. Therefore, the statistical model may be merely signaling that beneficiaries who are served by CMHC's have a higher degree of underlying risk rather than reflecting anything particular about the influence of CMHC services have on propensity for readmission.

To further investigate this, the claims for beneficiaries who had received care from a CMHC (n = 4,564) in the 90 days prior to hospitalization were isolated, and a chi-squared test was performed to determine the degree of association between CMHC utilization in the 30 days after discharge and readmission. Even when the analysis was restricted to only individuals who had recently received a service from a CMHC – a presumably more high-need population – receiving care from a CMHC was still significantly associated with readmitting to the hospital. Table 2 displays the results of this analysis.

Table 2. Readmission Rates Amongst Current CMHC Patients

Patient was Served by a CMHC with the 90 Day Period Prior to Admission	Patient was Readmitted within 30 Days of Discharge	
	No	Yes
No	84.2%	15.8%
Yes	80.4%	19.6%

$\chi^2 = 10.93$
$p = 0.001$

Professionals who practice in CMHC settings are forced to make extraordinarily challenging decisions in the process of caring for their clients. For example, they are asked to simultaneously prevent suicides; while at the same time preventing psychiatric hospitalizations. What choice should they make when the most effective means of stopping their client from attempting suicide is to send them to the hospital?

This point may be particularly relevant given the time period of this study. During 2019, CMHC's in Kentucky were operating in a policy environment that emphasized the "Zero Suicide Initiative" – an institutional commitment to dramatically reducing the number of suicides in the nation. In other words, it seems unreasonable to assume that CMHC services *caused* their clients' symptoms to worsen to the point of requiring re-hospitalization. What seems more likely – and more aligned with the evidence – is that CMHC professionals were noticing cases where their recently discharged clients were still acutely troubled, and they referred them back to the hospital.

Did Black and White beneficiaries differ in their utilization of health services after hospital discharge?

Health equity experts have noted that a racial disparity in access to, and receipt of, healthcare services is one important domain of measuring the functioning of the healthcare system. Results of these analyses suggest that – compared to Black beneficiaries – a greater percentage of White Medicaid beneficiaries with a psychiatric condition saw an outpatient provider and filled a prescription during the 30 day period following hospital discharge.

Table 3. Health Services Utilization and Medical Comorbities by Race

Patient's Race	Seen by an OP Provider[a]	Filled a Prescription[a]	Seen by CMHC[a]	Seen by CMHC[b]	Medical Comorbidity
Black	48.4%	76.6%	18.4%	17.2%	28.3%
White	53.7%	83.2%	18.9%	17.9%	29.5%

[a]Within 30 days of discharge from index hospitalization
[b]Within 90 days prior to admission for index hospitalization
CMHC = Community Mental Health Center
OP = Outpatient/Ambulatory Care Provider
Medical Comorbid Conditions included: Sepsis, Heart Failure, COPD, Acute Myocardial Infarction, Diabetes & Pneumonia

Additional Reading

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Appendix
Predictors of 30-Day Readmission in Medicaid Beneficiaries
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Logistic Regression Model
Predictors of 30-Day Hospital Readmission in Kentucky Medicaid Beneficiaries with Psychiatric Illness

	Estimate	Standard Error	Z Value	Odds Ratio (95% CI)	P value
Intercept	-2.995628	0.120712	-24.816	0.005 (0.039-.006)	p < 0.001
Patient's Age at Admission	-0.001141	0.001805	-0.632	0.999 (0.995-1)	p = 0.527
Patient's Race					
White (Reference)	-	-	-	-	-
Black	-0.158371	0.064477	-2.456	0.854 (0.751-0.967)	p = 0.014
Latinx	-0.401584	0.226691	-1.772	0.669 (0.417-1.02)	p = 0.077
Asian	-0.284192	0.407230	-0.698	0.753 (0.309-1.56)	p = 0.485
Patient's Sex					
Female (Reference)	-	-	-	-	-
Male	0.361577	0.041116	8.794	1.44 (1.32-1.56)	p < 0.001
Patient's Rurality					
Rural (Reference)	-	-	-	-	-
Urban	0.615486	0.083466	7.374	1.85 (1.58-2.19)	p < 0.001
Suburban	0.197013	0.086976	2.265	1.22 (1.03-1.45)	p = 0.024
Psychiatric Diagnosis					
Substance Use Disorder (Reference)	-	-	-	-	-
Schizophrenia/Psychosis	0.481320	0.067516	7.129	1.62 (1.42-1.85)	p < 0.001
Mood Disorders	-0.002845	0.046308	-0.061	0.997 (0.911-1.092)	p = 0.951
Anxiety Disorders	-0.484337	0.075798	-6.390	0.616 (0.529-0.713)	p < 0.001
Outpatient Visit[a]					
No (Reference)	-	-	-	-	-
Yes	0.483399	0.044097	10.962	1.62 (1.49-1.77)	p < 0.001
Filled Prescription[a]					
No (Reference)	-	-	-	-	-
Yes	0.059056	0.056506	1.045	1.06 (0.95-1.19)	p = 0.296
Medical Comorbidity					
No (Reference)	-	-	-	-	-
Yes	0.254122	0.046734	5.438	1.29 (1.18-1.41)	p < 0.001
Continuous Enrollment					
No (Reference)	-	-	-	-	-
Yes	-0.066027	0.047207	-1.399	0.936 (0.854-1.03)	p = 0.162
CMHC (Pre-Admission)[b]					
No (Reference)	-	-	-	-	-
Yes	0.246212	0.056576	4.352	1.28 (1.14-1.43)	p < 0.001
CMHC (Post-Discharge)[a]					
No (Reference)	-	-	-	-	-
Yes	0.174536	0.056943	3.065	1.19 (1.06-1.33)	p = 0.002
Psych. Case Management (Post-Discharge)[a]					
No (Reference)	-	-	-	-	-
Yes – CMHC	0.835810	0.112131	7.454	2.31 (1.85-2.87)	p < 0.001
Yes – Non-CMHC	-0.538307	0.494005	-1.090	0.5837 (0.208-1.47)	p = 0.276

[a]Within 30 days of discharge from index hospitalization
[b]Within 90 days prior to admission for index hospitalization