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Do Primary Care Medical Homes Facilitate Care Transitions After Psychiatric Discharge for Patients with Multiple Chronic Conditions?

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Abstract

Objective—Primary-care-based medical homes may facilitate care transitions for persons with multiple chronic conditions (MCC) including serious mental illness. The purpose of this manuscript is to assess outpatient follow-up rates with primary care and mental health providers following psychiatric discharge by medical home enrollment and medical complexity.

Methods—Using a quasi-experimental design, we examined data from NC Medicaid-enrolled adults with MCC hospitalized with an inpatient diagnosis of depression or schizophrenia during 2008-2010. We used inverse-probability-of-treatment weighting and assessed associations between medical home enrollment and outpatient follow-up within 7 and 30 days post discharge.

Results—Medical home enrollees (n=16,137) were substantially more likely than controls (n=11,304) to receive follow-up care with any provider 30 days post discharge. Increasing patient complexity was associated with a greater probability of primary care follow-up. Medical

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complexity and medical home enrollment were not associated with follow-up with a mental health provider.

Conclusions—Hospitalized persons with MCC including serious mental illness enrolled in a medical home were more likely to receive timely outpatient follow-up with a primary care provider, but not with a mental health specialist. These findings suggest that the medical home model may be more adept at linking patients to providers in primary care rather than to specialty mental health providers.

Keywords

medical home; multiple chronic conditions; psychiatric hospitalization; outpatient follow-up

1. Introduction

Patients with multiple chronic conditions who are newly discharged from acute care hospitals have complex care needs [1]. The post-hospitalization period is a time of increased vulnerability [2-4] with a higher probability of adverse events including medication reactions [5], complications of hospitalization [6, 7], and failure to follow up with critical tests or lab results [8-10]. Furthermore, because patients and caregivers may make errors in medication administration or fail to recognize worsening symptoms during the period following hospitalization [5, 8-10], this is a window of opportunity where timely outpatient follow-up may be essential. Patients with comorbid psychiatric and medical conditions, who contribute disproportionately to overall healthcare costs, are at particular risk for re-hospitalization [11]. Public insurance programs such as Medicare and Medicaid bear much of the cost for readmissions [12, 13]. Among non-elderly Medicaid patients in 2007, readmissions for mental illness occurred at a rate of 11.8%, second only to circulatory conditions, and accounted for 12% of all non-obstetric readmissions [13].

In recent years, health systems have focused increasingly on improving the transition in care from the inpatient setting to the outpatient setting, especially through enhanced communication, patient engagement, and coordination of providers [14-16]. Early outpatient follow-up may improve communication between providers in different settings as well as increase patient engagement. In theory, prompt follow-up allows continued disease monitoring and facilitates the coordination of inpatient and outpatient care plans, including medication reconciliation to minimize medication interactions and adverse reactions, reinforcement of medication adherence, and matching of individual needs with appropriate services to prevent subsequent hospital readmissions. In practice, follow-up within 30 days of discharge may not always improve outcomes. A recent study found that after controlling for covariates, follow-up within seven days of discharge from a Veteran Affairs hospitalization for major depression modestly improved the rate of receipt of guideline concordant psychotherapy, but was weakly related to receipt of antidepressants or rehospitalization [17]. Patient and service system characteristics, such as contacts prior to admission and stays in general versus psychiatric hospitals, have been found in other studies to be positively associated with rates of outpatient follow-up among persons with schizophrenia [18]. The timing of mental health follow-up visits is important; persons with a mental health follow-up visit within 7 days had equal or lower hospital readmission and

emergency department services in the following six months, compared to persons who did not receive follow-up within 30 days [19].

Despite mixed empirical evidence, the benefit of early outpatient follow-up following discharge has intuitive appeal in terms of greater treatment engagement and increased opportunities for intervention and observation. Yet, among Medicare and Medicaid enrollees with hospital readmissions, fewer than half receive outpatient follow-up between discharge and readmission [12, 20]. Low rates of outpatient follow-up are explained in various ways in the literature, but are generally attributed to both system and patient characteristics, including lack of an established outpatient clinician, length of time to follow-up appointment, and severity of condition [21].

Primary care medical homes may reduce or eliminate some of these barriers to outpatient follow-up. Medical homes are intended to provide a usual source of care, expanded access to care, facilitation of patient engagement through care management, and promotion of coordination amongst providers. The patient-centered medical home model also promotes a “whole person” orientation, encompassing both mental and physical health, and makes greater use of team approaches to treatment [22]. In combination, these strategies may improve outpatient follow-up post discharge.

Early outpatient follow-up with a mental health provider after psychiatric discharges specifically may be optimal, as suggested by commonly utilized quality indicators: receipt of outpatient mental health follow-up visits within 7 and 30 days of psychiatric discharge (National Committee for Quality Assurance Healthcare Effectiveness Data Information Set) [23]. Early outpatient follow-up with a primary care provider for all types of hospitalizations for persons with MCC is also beneficial for continued monitoring of both mental and physical conditions and prevention of hospital readmission. Conditions such as depression are often managed in primary care, without involvement of mental health specialists. To our knowledge, no prior study has examined the rates of both primary care and mental health follow-up after a hospital discharge with a psychiatric diagnosis among adults with MCC. In this study, we examined whether, among Medicaid enrollees with serious mental illness (schizophrenia and/or major depressive disorder) and at least one other chronic condition, those enrolled in a primary-care-based medical home were more likely to receive follow-up with 1) primary care providers or 2) mental health specialists within 30 days of discharge from an inpatient setting, as compared to those not enrolled in a medical home.

2. Methods

2.1 Data

We used the North Carolina Integrated Data for Researchers (NCIDR), a unique data source containing North Carolina Medicaid claims data linked with data from state psychiatric hospitalizations, state-funded mental health services, and encounters from a five-county regional behavioral health carve-out [24]. The data included demographic information and monthly data on Medicaid enrollment, medical home enrollment through the Community Care of North Carolina (CCNC) program, diagnoses, and medical care utilization for fiscal years 2008 through 2010. The linked data source allowed for greater detection of mental

illness, as mental health diagnoses were available from all four administrative data systems, patching gaps in Medicaid claims during periods of disenrollment, and including psychiatric hospitalizations not covered by Medicaid (i.e., stays in state-operated psychiatric facilities that are subject to the Institute for Mental Disease exclusion for non-elderly adults).

2.2 Study Design and Sample

The study samples included persons in the administrative data sources with two or more of the following eight chronic health conditions: major depressive disorder, schizophrenia, hypertension, diabetes, hyperlipidemia, seizure disorder, asthma, and chronic obstructive pulmonary disease. We required at least one inpatient diagnosis or two outpatient diagnoses at any point during the three-year study period. Starting with this group of Medicaid enrollees with multiple chronic conditions, we created an observation for each hospital stay in which hospital diagnoses included depression or schizophrenia. This broad definition includes hospitalizations for mental illness as well as hospitalizations for medical conditions during which mental illness were detected or possibly complicated the stay. Multiple hospital stays per person were included in the study sample. The hospitalizations in our data included Medicaid-funded general hospital stays (both medical and psychiatric) as well as state psychiatric hospital stays regardless of funding source. We included only persons age 18-64 who were enrolled in Medicaid for the six months before and including the month of discharge and who were not dually enrolled in Medicare. We removed left- and right-censored stays; that is, those that occurred less than 6 months after the beginning or within 30 days of the end of our study period. We also conducted separate analyses on two types of hospital discharges that are more likely to reflect targeted stays for a serious mental illness: (i) discharges from state psychiatric hospitals and (ii) Medicaid-funded general hospital stays with a psychiatric DRG code.

2.3 Measures

The main outcome measures were the occurrence of an outpatient visit within 7 and 30 days of a psychiatric hospital discharge. Outpatient visits included only face-to-face office visits; physical/occupational therapy claims were excluded. For each time period (7 and 30 days) we separately measured outpatient visits to any provider (mental health, primary care, or other), to mental health specialists, and to primary care providers, based on provider specialty/type codes. All outpatient services provided through the regional behavioral health carve-out were assumed to be to a mental health specialist.

Patients were considered enrolled in a medical home if monthly management fees to both the primary care provider and the CCNC medical home network were identified in the claims during the month of discharge. The CCNC program is the medical home program for the state's Medicaid population and links enrollees to primary care medical homes, implements disease-specific quality improvement initiatives, and provides care management for high-risk patients [25]. Patient enrollment in a CCNC medical home was voluntary for our study population during the study period and could be initiated by either the patient or an affiliated CCNC provider or practice. In addition, practice participation in CCNC is voluntary, which can result in substantial variation between CNCC and non-CCNC practices. Practices that serve more Medicaid patients, or are more willing to use team

approaches to care, may be more likely to participate in CCNC, and patients in these practices may be more likely to enroll in the CCNC program. We control for observable differences between enrollees and non-enrollees, but selection bias on unobservables may remain. We refer to providers participating in the CCNC program as medical homes, but note that the CCNC medical homes predate the National Committee for Quality Assurance recognition program by more than a decade and thus may or may not be recognized by that program as medical homes.

The control group consisted of individuals in the Medicaid program who met all inclusion and exclusion criteria and were in the fee-for-service Medicaid program, but not enrolled in a CCNC medical home, during the study period.

Medical complexity was measured by number of chronic conditions present during the three-year study window, based on the Chronic Illness and Disability Payment System [26] and excluding the two target conditions (depression and schizophrenia). We conducted subgroup analyses on persons in the lowest (seven or fewer conditions) and the highest (12 or more conditions) quartiles of the distribution of number of conditions.

2.4 Statistical Analysis

Inverse-probability-of-treatment-weighted (IPTW) logistic regression models were run on binary indicators of follow-up within 7 and 30 days, for each of the three types of follow-up visits (any, mental health specialty, or primary care). Models examined the association between medical home enrollment at the time of discharge and receipt of follow-up within the specified time period. We generated inverse-probability-of-treatment weights from a model estimating the propensity for medical home enrollment as a function of demographics (age in quadratic form, race, ethnicity, sex); a linear time trend; the number of months enrolled in Medicaid; participation in the five-county carve-out at the time of discharge; and a large number of clinical and service use measures from the six calendar months prior to the month of discharge, including number of chronic conditions, the total number of prescriptions for the target medical conditions, the total number of outpatient visits, the number of outpatient mental health visits, the total number of hospital admissions generally and for depression or schizophrenia, the number of psychotherapy visits, and (for the schizophrenia sample only) participation in an ACT team (Table 1). Propensity and outcome models were stratified by hospital diagnosis (schizophrenia vs. depression without schizophrenia). Additional analyses were run separately for state psychiatric hospital stays, stays with psychiatric DRGs, and stays in the lower and upper quartiles of the distribution of number of chronic medical conditions.

2.5 Sensitivity analyses

Because individuals living in residential facilities were exempt from medical home enrollment, we reran our analyses excluding those individuals. To do so, we used an indicator of living in a residential facility that has limited reliability because it relies on voluntary reporting in the Medicaid enrollment record. Since the majority of the sample (89%) was not reported as living in a residential facility, results from the sensitivity analysis were quite similar to those from the main analysis (though with generally stronger

associations between medical home enrollment and early follow-up) and therefore are not reported here.

The study protocol was exempted by the University of XX Institutional Review Board (blinded for peer review).

3. Results

Tables 1 and 2 display the sample characteristics of observations with schizophrenia and depression diagnoses, respectively, before and after applying inverse-probability-of-treatment weights. Persons with schizophrenia were evenly divided between men and women and were mostly of African American race. Persons with depression were predominantly female and Caucasian. Average age was 40-43. There were a number of differences at baseline between enrolled and non-enrolled patients. Unweighted means suggest that prior to hospitalization, medical-home-enrolled patients generally received more outpatient services and fewer inpatient services and were more likely to be taking psychotropic medications, compared to the non-enrolled sample. After applying IPTW, the imbalance was reduced to less than a 5% standardized difference for all variables.

Weighted rates of outpatient follow-up within 7 days of hospital discharge, and the estimated effects of medical home enrollment, are presented in Table 3. Analogous results for 30-day follow-up are presented in Table 4. In the control group, approximately 36% of patients with schizophrenia and 30% of patients with depression had a follow-up visit within 7 days, increasing to 71% and 70% within 30 days. For persons with schizophrenia, follow-up with a mental health specialist was more common than follow up with a primary care provider at 7 days (20.3% vs. 6.4%) and at 30 days (42.6% vs. 22.9%). For persons with depression, follow-up rates with a mental health specialist vs. a primary care provider were similar at 7 days (9.8% vs. 10.6%), but mental health follow-up was lower than with primary care at 30 days (24.1% vs. 34.5%). Mental health follow-up rates were considerably higher for persons with depression following a state psychiatric hospitalization (26.4% at 7 days and 50.6% at 30 days), compared to the overall mental health follow-up rates. In contrast, primary care follow-up rates were lower after a state psychiatric hospitalization than after any hospitalization or hospitalization with a psychiatric DRG, consistent with prior literature [18]. Notably, very few people had both mental health specialty and primary care visits (<2% of each sample within 7 days; 10-13% within 30 days), and a large proportion had neither mental health specialty nor primary care visits (75-79% within 7 days; 43-45% within 30 days) (data not shown).

Medical home enrollment was associated with slightly lower rates of mental health follow-up within 7 days for patients with schizophrenia, and slightly higher rates of PCP follow-up within 7 days for patients with schizophrenia and patients with depression. Greater follow-up rate differences were observed at 30 days. Medical home enrollees with schizophrenia and depression, respectively, had a 5.0 and 4.1 percentage point higher rate of follow-up with any provider within 30 days, and an 8.2 and 10.3 percentage point higher rate of follow-up with a primary care provider ($p < 0.01$). Medical home enrollment was not associated with mental health follow-up within 30 days, with the exception of a 7.4

percentage point increase for patients with schizophrenia following state psychiatric hospitalization ($p<0.05$).

Medical complexity influenced the likelihood of follow-up with a primary care provider or any provider, as well as the relation between medical home enrollment and follow-up (Table 4 and Figure 1). For example, non-enrolled patients with schizophrenia in the highest quartile of medical complexity (with 12 or more chronic conditions) had a 30-day primary care follow-up rate of 32.0%, compared to 14.2% among those in the lowest quartile of medical complexity (with 7 or fewer chronic conditions). Medical home enrollment increased primary care follow-up rates by 13.7 percentage points for the more complex patients and by 4.1 percentage points for the less complex patients ($p<0.01$ for both). Similar patterns were observed among patients with depression. Medical complexity and enrollment in a medical home had virtually no impact on whether the patient received follow-up with a mental health specialist, however.

Figure 1 illustrates the impact of medical home enrollment on 30-day follow-up by provider type, diagnosis, and medical complexity. More complex patients had higher rates of follow-up with a PCP and any provider, and enrollment in a medical home increased the rate of follow-up with a PCP and any provider relative to the rate among those not enrolled, independent of whether the person had schizophrenia vs. depression.

4. Discussion

Pressure to reduce 30-day readmissions has been increasing since the passage of the Affordable Care Act, with a 1% reduction in Medicare payments to hospitals with excess readmission rates beginning in October 2012 and a 3% reduction beginning in the third year. Hospital readmissions have been further emphasized as a measure of performance in Medicare accountable care initiatives and the Medicaid adult core quality measure set, and many states have implemented additional policies aimed to reduce readmissions in Medicaid [27]. Successful interventions to reduce hospital readmissions have emphasized care coordination after discharge and early outpatient follow-up, services that patient centered medical homes may be well-positioned to provide. This study confirms higher rates of outpatient follow-up associated with medical home enrollment among a patient population particularly vulnerable to hospital readmission: Medicaid recipients with multiple chronic conditions including a mental illness.

While the actual mechanism by which medical homes achieve greater rates of transitional care could not be examined with available data, we found substantially stronger effects of medical homes on follow-up with primary care providers than on follow-up with mental health specialists. There may be a variety of mechanisms at play, including greater appointment availability for hospital follow-up in the medical home, better systems for communication and appointment scheduling between the inpatient discharge planning team and the primary care setting, and the use of care coordination to address barriers such as scheduling or transportation difficulty. During our study time frame, a medical home care management initiative to provide transitional care services to high-risk individuals was piloted [28]. The initiative, eventually implemented statewide, reduced readmissions by 20%

for patients receiving transitional care management, with the greatest impact observed among persons with highest risk of readmission. Our data did not permit us to examine the extent to which this initiative explained the observed differences in follow-up rates.

While we are unaware of any prior studies examining rates of both 7- and 30-day follow-up with primary care and mental health providers following a discharge with a psychiatric diagnosis, two similar studies provide additional context for our findings. Olfson and colleagues reported 7- and 30-day schizophrenia-related follow-up rates of 41.7% and 59.3% [18]. While we use a broader measure of hospitalization, our findings demonstrate a similar pattern of low mental health care utilization following discharge. In addition, the rates of outpatient visits to mental health specialists in our sample prior to hospitalization were similarly low, with approximately 33% of the sample with schizophrenia and 45% of the sample with major depression having no outpatient mental health visits in the six months prior to the index hospitalization. A recent study examined readmission rates for mental health and/or substance use disorder among a national sample of Medicaid enrollees from 2004-2009. Among 121,271 discharges, they found that 46% had any follow-up in 7 days, but only 7.4 % and 11.4% had follow-up with a psychiatrist or community mental health center respectively [29]. Although these results represent a broader population group and are not directly comparable to our findings, they similarly reflect lower rates of follow-up with primary care and mental health providers post hospital discharge. Transitions in care remain a fundamental challenge of the health care system, and one that is not entirely solved by medical homes.

In the current study, enrollment in a primary care-based medical home appeared to be a strong predictor of visits to a primary care provider but was less strongly associated with visits to a mental health specialist. Patients with mental illness were more likely to see a primary care provider when they had a greater burden of comorbid conditions. Combined, these findings suggest that the medical home model may be more adept at linking patients to primary care providers than to specialty mental health services. For complex patients with serious mental health problems and many comorbid conditions, it is important for providers to address both the physical and mental health needs of patients following hospital discharge. The growing movement toward providing both primary and specialty mental health care in a single setting may create additional capacity to address the range of physical and mental health needs of the population with multiple chronic conditions. This may become more important if payment rates for mental health readmissions become a target of the Hospital Readmission Reduction Program.

This study has several limitations. IPTW analysis balances the array of observable diagnostic and service use characteristics between medical homes enrollees and controls, but cannot balance unobserved factors, which could include severity of illness and other variables influencing timely outpatient care. In terms of outcomes, we were able to count numbers of mental health and primary care visits, but not to examine the competencies of providers (for example, the ability of primary care providers to address mental health concerns) or the content of the visits (for example, the degree to which mental health needs were addressed during primary care visits). Our sample was limited to hospitalizations with an administrative diagnosis of depression or schizophrenia; the findings may not generalize

to stays with other psychiatric diagnoses. Similarly, North Carolina's medical home program may not generalize to other states or medical home models nationwide.

5. Conclusions

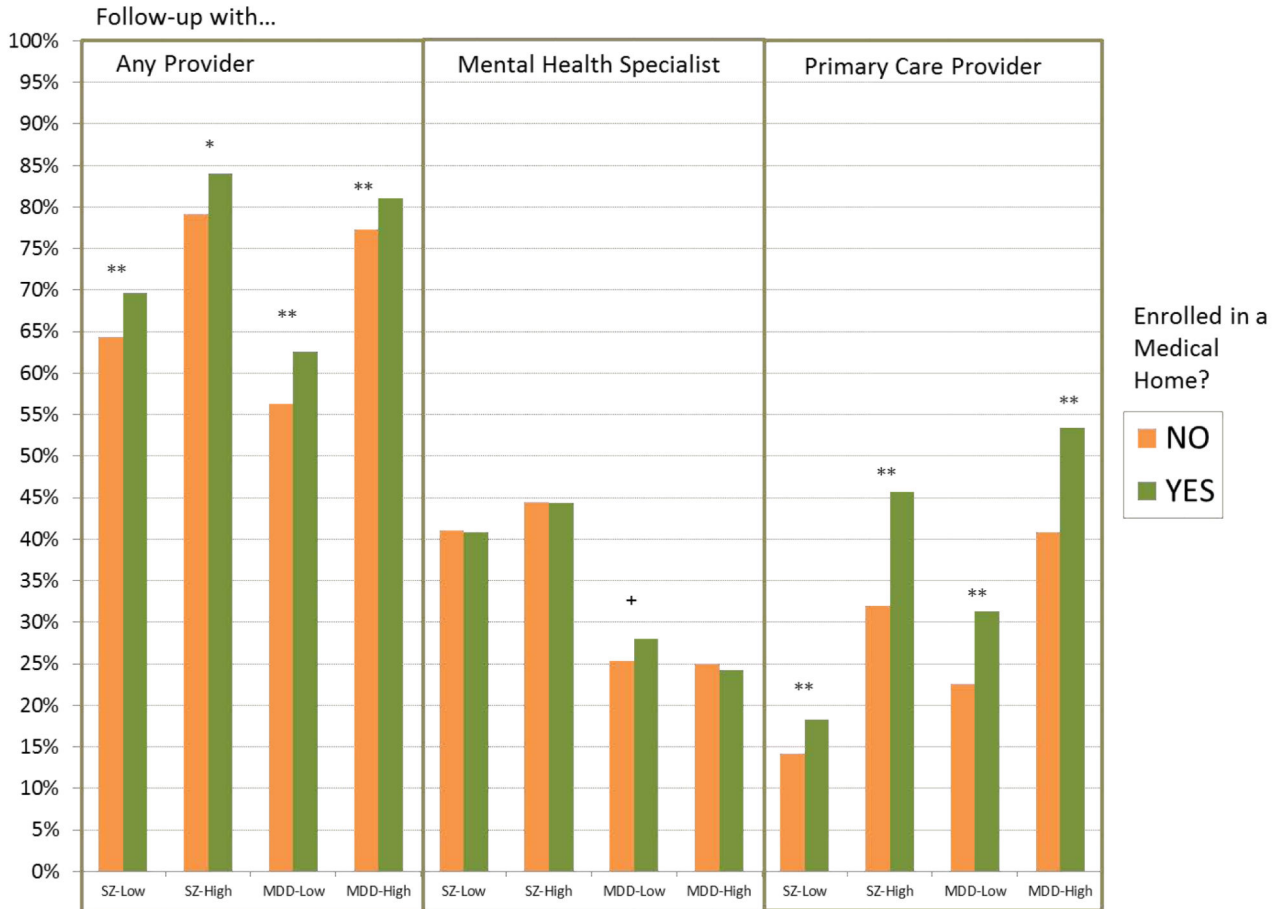
In conclusion, the immediate post-hospital discharge period is a time of increased risk of readmission, particularly for persons with publicly funded insurance, multiple chronic conditions, and psychiatric comorbidities. Interventions to reduce 30-day readmissions often include early outpatient follow-up care, which may be facilitated by Accountable Care Organizations and medical homes. Examining data from adult Medicaid medical home enrollees with hospitalizations including a psychiatric diagnosis, we found that medical home enrollment increased follow-up rates with primary care providers but had little effect on outpatient follow-up with mental health providers. While medical home enrollment was associated with increased rate of primary care follow-up, this patient population with multiple chronic conditions exhibits substantial treatment costs and readmission risk, suggesting a need for additional strategies to increase the rate of mental health and primary care follow-up post discharge.

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30 day Outpatient Follow-up Rates Following Hospital Discharge



'Schiz' and 'Depr' indicate that the patient had a diagnosis of schizophrenia or depression (without schizophrenia), respectively, during the hospitalization. 'Low' and 'High' indicate patients in the bottom and top quartile in terms of medical comorbidities, respectively.

Note: 'SZ' and 'MDD' indicate that the patient had a diagnosis of schizophrenia or major depression (without schizophrenia), respectively, during the hospitalization. 'Low' and 'High' indicate patients in the bottom and top quartile in terms of medical comorbidities, respectively. All estimates are reported in Table 4. *= $p < 0.05$; **= $p < 0.01$.

Figure 1.
 Adjusted Rates of Patients Receiving a Follow-up Visit with an Outpatient Provider within 30 Days of a Hospital Discharge

Table 1

Sample Characteristics for Persons with Hospital Stays with a Diagnosis of Schizophrenia, by Medical Home Enrollment Status, Unweighted and Weighted (n=8783)

Variable	Unweighted estimates			Weighted estimates		
	Mean in Medical homes (n=5093)	Mean in controls (n=3690)	Standard difference in means (100*difference/SD)	Mean in Medical Homes (n=5093)	Mean in controls (n=3690)	Standard difference in means (100*difference/SD)
Demographics at Discharge						
Age (SD)	40.5 (12.6)	40.0 (13.3)	3.87	40.3	40.3	0.03
Male	44.7%	48.0%	6.67	46.2%	46.5%	0.66
Race						
White	36.6%	42.8%	12.68	39.1%	38.9%	0.46
African American	58.0%	52.3%	11.47	55.7%	56.0%	0.65
Native American	2.2%	2.2%	0.29	2.2%	2.2%	0.13
Other race	3.2%	2.7%	2.66	3.0%	2.9%	0.45
Latino	1.8%	1.6%	1.96	1.7%	1.7%	0.30
Ever enrolled in regional carve-out	4.5%	2.0%	14.07	3.4%	3.4%	0.01
Day of discharge	15.8 (8.7)	15.9 (8.7)	1.36	15.8	15.8	0.30
Covariates from six months prior to month of discharge						
Number of CDPS conditions	4.6 (2.7)	4.7 (2.9)	3.56	4.6	4.6	0.34
Number of target non-psychiatric medication classes received (0-6)	2.6 (2.0)	2.9 (2.1)	14.78	2.7	2.7	0.32
Number of outpatient visits (0-162)	12.9 (16.5)	11.1 (14.9)	11.16	12.3	12.9	3.69
Any target medical condition	52.4%	49.3%	6.17	51.2%	51.3%	0.20
Number of target medical conditions (0-6)	1.0 (1.2)	1.0 (1.2)	2.29	1.0	1.0	0.09
Number of outpatient mental health visits (0-109)	3.6 (5.8)	3.5 (5.5)	1.11	3.6	3.6	0.87
Number of hospital admissions (0-13)	0.9 (1.2)	1.1 (1.5)	11.08	1.0	1.0	0.16
Number of hospital days (0-184)	8.6 (16.0)	11.0 (19.8)	13.58	9.7	9.6	0.50
Number of hospitalizations with a schizophrenia dx (0-10)	0.69 (1.1)	0.81 (1.2)	10.46	0.76	0.73	0.09
Number of hospitalizations with a depression dx (0-8)	0.13 (0.45)	0.14 (0.51)	3.12	0.13	0.13	0.20
Any prescriptions for antipsychotic medications	84.4%	77.7%	17.43	81.9%	82.0%	0.21
Adherence to antipsychotic medications (PDC)	0.57 (0.37)	0.55 (0.39)	5.15	0.56	0.56	0.06
Number of family/group psychotherapy visits (0-26)	0.15 (1.15)	0.14 (1.06)	1.41	0.15	0.15	0.13
Number of individual psychotherapy visits (0-61)	1.4 (3.8)	1.6 (4.0)	4.13	1.5	1.5	0.06
Number of months in ACT (0-6)	0.55 (1.6)	0.48 (1.5)	4.62	0.52	0.51	0.37

Table 2

Sample Characteristics for Persons with Hospital Discharges with a Diagnosis of Major Depression, by Medical Home Enrollment Status, Unweighted and Weighted (n=18,658)

Variable	Unweighted estimates			Weighted estimates		
	Mean in Medical homes (n=11,044)	Mean in Controls (n=7614)	Standard difference in means (100*difference/S D)	Mean in Medical Homes (n=11,044)	Mean in controls (n=7614)	Standard difference in means (100*difference/S D)
Demographics at Discharge						
Age (SD)	43.0 (12.2)	42.2 (12.7)	6.67	42.7	42.7	0.12
Male	23.9%	27.8%	0.15	25.6%	25.8%	0.46
White	59.7%	66.2%	13.42	62.2%	61.9%	0.56
African American	33.2%	28.7%	9.72	31.5%	31.8%	0.66
Native American	2.6%	1.8%	5.47	2.3%	2.3%	0.17
Other race	4.5%	3.3%	5.98	4.0%	4.0%	0.04
Latino	2.0%	1.6%	2.65	1.8%	1.7%	0.80
Ever enrolled in regional carve-out (Piedmont)	8.2%	3.9%	17.67	6.5%	6.5%	0.03
Day of discharge	15.8 (8.7)	15.8 (8.6)	0.30	15.8	15.8	0.27
Covariates from six months prior to month of discharge						
Number of CDPS conditions (0-16)	5.6 (2.6)	5.3 (2.8)	0.30	5.5	5.5	0.01
Number of target non-psychiatric medication classes received (0-6)	3.5 (2.0)	3.7 (2.2)	8.30	3.5	3.5	0.61
Number of outpatient visits (0-167)	10.1 (9.8)	8.5 (8.3)	17.72	9.5	9.8	2.87
Any target medical condition	63.1%	58.0%	10.54	61.2%	61.0%	0.33
Number of target medical conditions (0-6)	1.2 (1.2)	1.1 (1.2)	9.36	1.2	1.2	0.53
Number of outpatient mental health visits (0-111)	2.1 (4.9)	1.7 (4.3)	7.01	1.9	2.0	0.50
Number of hospital admissions (0-18)	1.0 (1.7)	1.0 (1.6)	2.79	1.0	1.0	0.11
Number of hospital days (0-184)	5.6 (12.2)	6.6 (14.3)	7.64	6.1	6.1	0.08
Number of hospitalizations for depression (0-13)	0.43 (0.96)	0.45 (1.02)	1.91	0.43	0.43	0.30
Any prescriptions for antidepressant medications	76.7%	64.3%	27.52	71.9%	72.0%	0.14
Adherence to antidepressant medications (PDC)	0.49 (0.37)	0.39 (0.38)	25.12	0.45	0.45	0.21
Number of family/group psychotherapy visits (0-35)	0.087 (0.88)	0.079 (0.88)	0.94	0.084	0.083	0.11
Number of individual psychotherapy visits (0-96)	0.93 (3.1)	0.78 (2.7)	5.24	0.87	0.89	0.63
Number of months in ACT (0-6)	0.032 (0.40)	0.032 (0.41)	0.17	0.032	0.033	0.05

Table 3

Estimated Effects of Medical Homes on Rates of 7-day Follow-up

Outcome/Sample	Sample size	Seven day follow-up with any type of provider		Seven day follow-up with mental health specialist		Seven day follow-up with primary care provider	
		Mean in controls (Weighted)	Estimated Effect of Medical Homes (% point)	Mean in controls (Weighted)	Estimated Effect of Medical Homes (% point)	Mean in controls (Weighted)	Estimated Effect of Medical Homes (% point)
Schizophrenia							
Any hospitalization with a diagnosis of schizophrenia	8783	36.4%	1.7	20.3%	-2.0*	6.4%	1.8**
State psychiatric hospitalization	1367	39.5%	4.2	23.2%	4.5	2.6%	0.6
Hospitalizations with a psychiatric DRG	4540	38.8%	0.6	24.1%	-3.2*	5.2%	1.2
Among those with 7 or fewer chronic conditions (lower quartile)	3587	33.1%	2.2	20.1%	-1.4	3.1%	1.4*
Among those with 12 or more chronic conditions (upper quartile)	1825	40.2%	2.0	22.1%	-1.8	9.7%	2.4
Depression							
Any hospitalization with a diagnosis of depression	18,658	29.8%	1.7*	9.8%	0.14	10.6%	3.4**
State psychiatric hospitalization	419	34.9%	3.9	26.4%	1.3	5.0%	1.5
Hospitalizations with a psychiatric DRG	3754	40.4%	1.3	24.3%	0.6	10.3%	1.2
Among those with 7 or fewer chronic conditions (lower quartile)	4203	23.8%	3.0*	12.1%	-0.26	5.8%	2.8**
Among those with 12 or more chronic conditions (upper quartile)	5744	34.0%	2.0	8.8%	0.36	13.1%	4.7**

Note: mental health specialists include providers coded as psychiatrists, psychologists, psychologists/certified clinical social workers, licensed psychological associates, psychosocial rehabilitation, mental health providers, mental health HMOs, assertive community treatment team, critical access behavioral health agencies, psychiatric facilities, or mental health centers/hospitals; primary care providers are those coded as general/family practice, internal medicine, obstetrics/gynecology, pediatrics, nurse practitioners or CRNAs, health departments, rural health clinics, or FQHCs. Visits to any provider do not limit by provider type, and thus include these two categories as well all other provider types.

**
p<0.01

*
p<0.05.

Table 4

Estimated Effects of Medical Homes on Rates of 30-day Follow-up

Outcome/Sample	Sample size	30 day follow-up with any type of provider		30 day follow-up with mental health specialist		30 day follow-up with primary care provider	
		Mean in controls (Weighted)	Estimated Effect of Medical Homes	Mean in controls (Weighted)	Estimated Effect of Medical Homes	Mean in controls (Weighted)	Estimated Effect of Medical Homes
Schizophrenia							
Any hospitalization with a diagnosis of schizophrenia	7574	71.3%	5.0 ^{**}	42.6%	0.1	22.9%	8.2 ^{**}
State psychiatric hospital discharge	1125	70.2%	4.9	42.1%	7.4 [*]	17.8%	1.3
Hospitalizations with a psychiatric DRG	4327	73.3%	4.5 ^{**}	49.2%	0.1	19.9%	6.6 ^{**}
Discharge among those with 7 or fewer chronic conditions (lower quartile)	3149	64.4%	5.2 ^{**}	41.0%	-0.19	14.2%	4.1 ^{**}
Discharge among those with 12 or more chronic conditions (upper quartile)	1530	79.2%	4.8 [*]	44.4%	-0.07	32.0%	13.7 ^{**}
Depression							
Any hospitalization with a diagnosis of depression	17,360	69.6%	4.1 ^{**}	24.1%	0.85	34.5%	10.3 ^{**}
State psychiatric hospital discharge	376	68.2%	3.8	50.6%	2.2	19.5%	11.4 [*]
Hospitalizations with a psychiatric DRG	3651	75.4%	3.3 [*]	49.1%	2.7	33.1%	5.7 ^{**}
Discharge among those with 7 or fewer chronic conditions (lower quartile)	4020	56.3%	6.3 ^{**}	25.3%	2.7	22.6%	8.7 ^{**}
Discharge among those with 12 or more chronic conditions (upper quartile)	5193	77.3%	3.7 ^{**}	25.0%	-0.72	40.8%	12.6 ^{**}

Note: mental health specialists include providers coded as psychiatrists, psychologists, psychologists/certified clinical social workers, licensed psychological associates, psychosocial rehabilitation, mental health providers, mental health HMOs, assertive community treatment team, critical access behavioral health agencies, psychiatric facilities, or mental health centers/hospitals; primary care providers are those coded as general/family practice, internal medicine, obstetrics/gynecology, pediatrics, nurse practitioners or CRNAs, health departments, rural health clinics, or FQHCs. Visits to any provider do not limit by provider type, and thus include these two categories as well all other provider types.

^{**}
p<0.01

^{*}
p<0.05.