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Do Medical Homes Offer Improved Diabetes Care for Medicaid Enrollees with Co-occurring Schizophrenia?

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Abstract

Purpose—To determine whether Medicaid recipients with co-occurring diabetes and schizophrenia that are medical-home-enrolled are more likely to receive guideline-concordant diabetes care than those who are not medical-home-enrolled, controlling for confounders.

Methods—We used administrative data on adult, non-dually eligible North Carolina Medicaid beneficiaries with diagnoses of both diabetes and schizophrenia (N=3,897) for fiscal years 2008–2010. We evaluated the relationship between medical-home-enrollment and receipt of recommended diabetes care reimbursed by Medicaid (lipid profiles, HbA1c tests, medical

attention for nephropathy, and eye exams for those over 30), using fixed-effects regression models on person-month level data.

Results—There was a statistically significant, positive effect of medical home enrollment on receipt of Medicaid-funded eye exams, HbA1c tests, and medical attention for nephropathy, but not receipt of lipid profiles.

Conclusions—For Medicaid enrollees with diabetes and schizophrenia, medical home enrollment is generally associated with greater likelihood of receiving guideline-concordant diabetes care.

Keywords

Patient-centered care; schizophrenia; chronic disease; diabetes

While it is estimated that only 1.1% of the U.S. population suffers from schizophrenia spectrum disorders,¹ those who do suffer them are disproportionately underserved and often poor.² Individuals with schizophrenia are also disproportionately covered by Medicaid,³ the largest payer for mental health services in the country.⁴ More than half (54%) of people with a serious mental illness such as schizophrenia do not receive care when they need it.^{5–7} Moreover, providing quality health care for individuals with both schizophrenia and co-occurring chronic health conditions can be even more challenging, as individuals with multiple chronic conditions often require specialized health services.

This paper focuses on Medicaid enrollees with schizophrenia who also have diabetes. An estimated 10.9% of individuals with schizophrenia have comorbid diabetes,⁸ and the care they receive for their diabetes is often inadequate.^{9,10} It is estimated that more than 30% of individuals with diabetes and comorbid schizophrenia are not receiving appropriate pharmaceutical treatment for their diabetes.¹¹ In addition, Domino and colleagues⁹ found that receipt of recommended diabetes care such as HbA1c testing, eye exams, and nephropathy screening was lower among Medicaid enrollees with diabetes and comorbid schizophrenia compared with people with diabetes and other co-occurring chronic conditions, although diabetes medication adherence was higher. Individuals with schizophrenia have a higher relative risk of death from cardiovascular disease than the general population,¹² and evidence suggests that certain antipsychotic medications used for schizophrenia are associated with metabolic disorders including the development of diabetes.^{13–15} Due to the high risk of developing diabetes among individuals on certain antipsychotic medications, the National Committee on Quality Assurance (NCQA) includes screening for diabetes among antipsychotic users as a quality measure in its Health Effectiveness Data and Information Set (HEDIS).¹⁶

Improvements in health care for patients with multiple chronic conditions generally emphasize the importance of care coordination and case management.¹⁷ One care model that may lead to improved coordination for these populations is the medical home.^{18,19} The medical home model, increasingly popular in the U.S., emphasizes a team-based approach to care with the primary care provider as the driving force for coordinating care and ensuring continuity for patients seeing multiple specialists.²⁰ This model is particularly well suited

for diabetes care management since diabetes is typically managed in the primary care setting with periodic specialist consultation, evidence-based and well accepted standards of care for diabetes are available, and there is an established need to improve diabetes care quality.²¹

Early results demonstrate that the medical home is associated with improved quality of diabetes care.²¹ However, the health care needs and utilization among persons with multiple chronic conditions can be distinct from those with a single chronic condition.²² Therefore, many patients with multiple chronic conditions seek care from multiple providers, which can introduce disruptions in care continuity and result in adverse health outcomes and reduced quality of care.²³ Nevertheless, because the medical home model emphasizes care management and care coordination, it may also be a successful model for providing guideline-concordant diabetes care among individuals with diabetes and co-occurring chronic health and mental health conditions.²³

The medical home model may help mitigate several of the factors contributing to substandard diabetes care for the subpopulation with comorbid schizophrenia, and may help close the gap in quality of care. For example, individuals with schizophrenia may have difficulty articulating physical health concerns and issues to their mental health providers.²⁴ The medical home model may facilitate communication, and the emphasis on care continuity and the whole-person approach can help ensure that the responsibility to obtain needed care does not rest solely on the patient.²⁵ Further, by moderating the high degree of fragmentation that currently exists between the physical and mental health care system,²⁶ the medical home has the potential to improve diabetes care for individuals with co-morbid schizophrenia.

To our knowledge, no study thus far has examined whether medical home enrollment achieves this improvement in care. Using data from a cohort of patients with diabetes and schizophrenia, this study examines whether the receipt of Medicaid-funded recommended screening and monitoring is higher among medical-home-enrolled patients than among those not enrolled in a medical home. The findings will provide health care professionals a more complete understanding of the strengths of the medical home approach for treating chronic, complex physical health issues for individuals with co-morbid severe mental illnesses.

Methods

This study used a retrospective cohort design to determine the effect of medical home enrollment on receipt of recommended diabetes care among individuals with diabetes and schizophrenia for fiscal years 2008–2010. Medicaid enrollees with diabetes and schizophrenia who were enrolled in a medical home served as the treatment group, while similar individuals who were not in a medical home served as controls. The study used a linked administrative dataset, North Carolina Integrated Data for Researchers (NCIDR), which compiled data from four sources: (1) North Carolina Medicaid claims, (2) inpatient psychiatric hospital stays, (3) mental health services reimbursed with state funds, and (4) claims data from a five-county regional behavioral health carve-out from the state's Medicaid program.²⁷ During the study period Medicaid in North Carolina was primarily fee-for-service, with the exception of a regional behavioral health carveout described above as a

contributing data source. The sample for the present analysis included all North Carolina Medicaid enrollees with both diabetes, as defined by at least two outpatient or at least one inpatient administrative diagnosis of diabetes (250.XX, 271.4X, 357.2X, 362.0X, 366.41, 791.5X, V4585, V5391, V6546) and schizophrenia (295.XX). We used Medicaid-funded services to indicate quality of care; the additional data sources beyond Medicaid in this dataset contribute greater sensitivity in diagnoses, especially for mental illness.

Population studied

Our evaluation setting was Community Care of North Carolina (CCNC), a primary-care-based medical home program developed in the late 1990s for North Carolina's Medicaid population. Community Care of North Carolina is implemented through 14 community care networks, and these non-profit networks receive a modest per member per month (PMPM) payment from the state to provide care management services as well as training, coordination, data feedback medical support staff, pharmacists, and psychiatrists to participating practices.²⁹ In addition, the state pays participating primary care practices a PMPM fee, in addition to their regular fee-for-service reimbursement for care, to serve as medical homes and provide care coordination, on-call access, and quality improvement.^{27,28}

We identified a sample of individuals with comorbid schizophrenia and diabetes from Medicaid claims data. We then selected all person-months for these individuals, beginning with the first observed diagnosis of diabetes, yielding an initial sample of 264,670 person-months supplied by 8,526 individuals. Next, because all four outcome measures (described below) were derived from Medicaid claims, all person-months for which an individual was not enrolled in Medicaid were dropped from the sample, yielding 231,736 person-months from 8,326 individuals. We removed all months after an individual became dually eligible for Medicare, leaving 96,437 person-months supplied by 3,937 individuals. We excluded duals for two reasons: first, Medicaid data may be incomplete for this subpopulation if services were reimbursed entirely through Medicare, and second, duals were underrepresented in medical homes at the time of this study. Finally, person-months involving inpatient hospitalizations were removed from the sample, as the outcome data reflected only community-based services. The analysis was conducted on the remaining 87,741 person-months supplied by 3,897 individuals, with an average of 22.5 person-months per individual over the three-year study period.

Measures

We examined the four diabetes quality of care outcomes from the HEDIS Comprehensive Diabetes Care guidelines that are observable from claims data: (1) receipt of lipid profile (CPT codes: 80061, 83700, 83704, 83721), (2) receipt of eye examination for individuals age 30 or older, (3) medical attention for nephropathy (either nephropathy screening, receipt of nephropathy services, or receipt of ACE inhibitor/ ARB therapy), and (4) receipt of hemoglobin HbA1c test (CPT codes: 83036, 83037). Each of these services should be received at least once per year according to HEDIS standards. Receipt of eye exams and medical attention for nephropathy were determined using definitions provided in the HEDIS 2009 Comprehensive Diabetes Care Technical Update.²⁹ Because North Carolina Medicaid claims do not contain a provider-type code for nephrologists, receipt of medical attention for

nephropathy was modified from the HEDIS definition to be solely based on CPT procedure codes, ICD-9 diagnosis codes, claims with specific uniform billing revenue or bill type codes, and claims for angiotensin-converting enzyme/ angiotensin II receptor blocker (ACE/ ARB) prescriptions. Due to the fact that our data did not contain a specialty code for nephrologist, this measure may be underreported. All four study outcomes were coded as dichotomous (ever/ never received) at the person-month level.

We used the person-month analysis as our primary study design to capture changes in monthly medical home enrollment, Medicaid eligibility, and comorbid status over the study period. To provide context to our monthly level analysis, we also describe unadjusted annual testing rates for a restricted subsample of people continuously enrolled in Medicaid for the fiscal year (n=2,178), dividing them among ever- and never- medical homes enrollees (Figure 1).

The main independent variable of interest, medical home enrollment, was identified through a Medicaid enrollment file. Individuals in the sample could change their enrollment status on a monthly basis.

Analysis

Linear probability models with person-level fixed-effects and robust standard errors were used to estimate the effect of enrollment in a medical home on the probability of receiving each of the services in the given month. Fixed-effects regression controls for both observed and unobserved person-level factors that are stable throughout the study period, such as gender, age of onset of either condition, and race/ ethnicity. This approach compares an individual's care when enrolled in a medical home with that same individual's care when not enrolled in a medical home. Therefore, no matching is necessary because individuals act as their own controls. This method controls for the bias due to selection into medical homes based on time-invariant factors. It does not control for selection into medical homes based on factors that vary over time. If factors such as acute symptoms of either diabetes or schizophrenia are disproportionately likely to happen in either group, then the effect estimator is at risk of bias due to picking up those differences.

Results

The mean age in the sample was 47.50 years and was comparable for the subset of individuals enrolled in a medical home as those not in a medical home (Table 1). More than 60% of the observations were accounted for by medical homes enrollees. African Americans and women accounted for greater proportions of person-months in medical homes than in the full study population.

Unadjusted monthly rates of screening are reported in the left hand panel of Table 2. On average, 5% of both the medical homes and non-enrolled sample over age 30 received an eye exam in a given month and 14% of non-enrollees and 15% of medical home enrollees received an HbA1c test. 37% of non-enrollees received medical attention for nephropathy, compared with 44% of medical home enrollees. 11% of both medical homes enrollees and non-enrollees received lipid profiles in an average month.

We observed lower unadjusted annual rates of all tests among patients who were not enrolled in a medical home at any point during the year, compared with medical home enrollees: 40.6% compared with 43.4% for eye exams among those age 30 or older; 80.4% compared with 84.4% for receipt of HbA1c test; 64.8% compared with 72.8% for attention for nephropathy; and 74.8% compared with 76.5% for the receipt of lipid profiles (Figure 1).

In multivariate fixed-effects models on the monthly data, we found greater rates of Medicaid-funded screening for eye exams and HbA1c as well as medical attention for nephropathy among medical home enrollees (Table 2). The only measure that did not show a difference by medical homes status was receipt of lipid profile. We found a 0.87% point per month increase in the receipt of eye exams among medical homes enrollees age 30 and over, a 19.2% relative increase over the rates observed in non-enrollees. HbA1c tests were greater in medical homes enrollees by 1.5% points per month, a 10.8% proportional increase, and medical attention for nephropathy increased by 4.67% points per month, a 12.7% proportional increase monthly over the level observed in controls. We also found a positive coefficient on the receipt of lipid profiles in medical homes enrollees, but this result was not statistically significant. Sensitivity analyses on persons continuously enrolled in Medicaid for at least 80% of the 36-month period were qualitatively similar to those reported in Table 2, but had higher mean utilization rates and lower medical home effect sizes relative to those reported in the table.

Discussion

Medicaid or Children's Health Insurance Program medical home programs are either already initiated or in process in 46 states according to the non-profit National Academy for State Health Policy.³⁰ The current study suggests that the medical home model, which has grown in use,³¹ offers a unique opportunity to improve the care management and care coordination of patients with schizophrenia who present with comorbid conditions including diabetes. This study is the first to evaluate the effectiveness of the medical home in improving diabetes care among a sub-population of people with co-occurring diabetes and schizophrenia, and generally indicates improvement in the receipt of recommended diabetes care in this population in a given month. Medical home enrollees were significantly more likely to receive Medicaid-funded eye exams, HbA1c tests, and medical attention for nephropathy in a given month than those who were not enrolled.

Interestingly, we found no statistically significant difference in the receipt of Medicaid-funded lipid profiles for medical home enrollees in a given month. This finding suggests that the medical home alone may not increase rates of lipid profiles present in the subpopulation with schizophrenia. Further research is needed to understand the particular factors related to lipid profiles in this subpopulation in order to improve care.

Prior research has found that medical home enrollment by people with severe mental illness was associated with greater access to specialty mental health care, greater adherence to psychotropic medications, and greater rates of primary care utilization.³² Primary care utilization is particularly important, as a substantial body of research shows that this population's risk of developing cardiovascular and metabolic illnesses, including diabetes,

greatly exceeds the risk in the general population.³³ This study extends that work to demonstrate the value of the medical home in improving the quality of diabetes care among patients with comorbid diabetes and schizophrenia. As previously mentioned, fragmentation of care coordination between mental health specialists treating mental health symptoms and primary care providers treating physical health conditions has been cited as a reason for suboptimal management of comorbid physical health conditions in patients with serious mental illnesses.²⁶ The primary care based medical home model appears to be a viable method for increasing care coordination and improving guideline concordance with recommended diabetes screening in this population. Although not directly measured, this model may have benefits for improving patient outcomes and reducing diabetes related outcomes in this patient population.

Several limitations to this study should be noted. First, our outcome measures reflect only services funded through the Medicaid program and do not reflect services or tests received at free clinics or otherwise not billed to Medicaid, and services received during months that patients were not eligible for Medicaid. Due to the fact that months without Medicaid enrollment were not included in the study, it is possible that actual monthly rates of receipt of care may be different than those reported here. Our study uses secondary data and is limited to those individuals with diagnoses of diabetes and schizophrenia (recorded on the claim by a clinician and not independently verified by the research team) who were not dually enrolled in Medicare. Therefore, our findings are generalizable only to the population of individuals who have Medicaid and received administrative diagnoses of schizophrenia and diabetes, not to the entire population of individuals with diabetes and schizophrenia, and not to dually-enrolled individuals. We focused our analysis on four quality measures that are observable from claims data; these results may not generalize to other measures of quality of care or other patient-level outcomes. There are tradeoffs between the person-month analysis reported here and an annual analysis requiring 12 months of continuous enrollment in medical homes. We ultimately selected the monthly analysis as a stronger design, as it has greater generalizability due to the inclusion of new and partial-year Medicaid and medical home enrollees. However, this level of analysis does not map directly to annual receipt in that some people may have had more than one month of service use. This was especially the case in our data for medical attention for nephropathy, as 2,145 of the 3,897 individuals who contributed person-months to the study (55.0% of the sample) had at least one fiscal year with more than one month of use. Additionally, because we excluded from our analysis all 8,696 person-months in which individuals received inpatient care, we have likely underestimated the amount of care individuals received. However, the goal of our study was to assess the effectiveness of an intervention targeting improvement in delivery of outpatient preventive services. In keeping with this goal, we restricted our analysis to care provided in an outpatient setting. Finally, as described above, the fixed-effect method is susceptible to bias if time-varying confounders, such as changes in diabetes severity, are imbalanced between treatment groups. The fixed-effect methodology controls for every observed and unobserved difference between medical home enrollees and non-enrollees, as long as those differences do not vary over the study period. This means that our analyses control for prior history of hospitalization, care coordination history, and lifetime severity of illness, for example. However, if any differences remained that disproportionately affected medical

home enrollees, we would be at risk of attributing them to the medical home effect. This method also does not allow examination of interactions between time-invariant covariates and treatment.

In conclusion, this study suggests that medical home enrollment is associated with improved diabetes care for individuals with co-occurring schizophrenia. It shows that among Medicaid recipients with diabetes and schizophrenia in the state of North Carolina, over a three-year period, those enrolled in a medical home in a given month were significantly more likely to receive recommended care related to receipt of eye exams, receipt of HbA1c tests, and medical attention for nephropathy. Further research should explore whether medical homes for non-Medicaid populations, or in other states, exhibit similar positive relationships.

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Figure 1.
Receipt of Medicaid funded services.^a

Notes:

^aSubsample of continuously Medicaid-enrolled people with diabetes and schizophrenia; 2,026 individuals contributing 3,629 annual observations. Eye Exam is for Individuals over 30 only

Figure 1 Data

Eye Exam

Medical Home	0.4343322
Non-Medical Home	0.4060475

HbA1c Test

Medical Home	0.8444521
Non-Medical home	0.8042169

Medical Attention for Nephropathy

Medical Home	0.7276184
Non-Medical home	0.6458944

Lipid Test

Medical Home	0.7652955
Non-Medical home	0.747992

Table 1

DEMOGRAPHIC CHARACTERISTICS OF NORTH CAROLINA ADULT MEDICAID RECIPIENTS WITH DIABETES AND SCHIZOPHRENIA BY MEDICAL HOMES ENROLLMENT STATUS, 2008–2010, SAMPLE SIZE: NT=87,741, N=3,897^a

Characteristics	Full Sample	Medical Home (NT=54,469)	Non-Medical Home (NT=33,272)
Age in Years	47.50 (10.87)	47.55 (10.66)	47.42 (11.21)
Race/Ethnicity			
African American	57.19%	58.66% ^b	54.79%
White	37.43%	35.64% ^b	40.36%
Hispanic Ethnicity	1.48%	1.39% ^b	1.61%
Male	33.21%	30.61% ^b	37.48%

Notes:

^aStandard errors reported in parentheses. T-test of mean age between groups was not statistically significant (p = 0.05).

^bbivariate chi-squared test of proportions between Medical Homes and non-Medical Homes is statistically significant at p<.01.

Table 2

RESULTS OF MULTIVARIATE FIXED-EFFECT ANALYSES OF DIABETES SCREENING AND TESTING SERVICES BY MEDICAL HOMES ENROLLMENT AMONG NORTH CAROLINA ADULT MEDICAID RECIPIENTS WITH DIABETES AND SCHIZOPHRENIA, 2008–2010^a

Percent of people receiving each service in a given month	Means		Effect Sizes from Fixed-effect Models	
	Unadjusted Mean Non-Medical Home (NT=33,272)	Unadjusted Mean Medical Home (NT=54,469)	Effect of Medical Home (% point increase)	Standard Error
Eye Exam for people age ≥ 30 ^b	4.53%	5.15% ^c	0.87 ^{**}	.0027
HbA1c Test	13.94%	15.44% ^c	1.50 ^{***}	.0041
Medical Attention for Nephropathy	36.65%	43.73% ^c	4.67 ^{***}	.0081
Lipid Test	10.69%	11.39% ^c	0.32	.0036

Notes:

*
p<.05

**
p<.01

p<.01

^aThe first two columns report unadjusted means by treatment status, whereas the third column gives the fixed-effect estimate of medical homes enrollment for each of the four measures. Test for hypothesis that there is no difference between Medical Home and non-Medical Home rate.

^b30,383 monthly observations from the control group and 50,490 observations from the medical homes enrolled sample.

^cBivariate chi-squared test of proportions between Medical Homes and non-Medical Homes is statistically significant at p<.01.