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A comparison of adherence to hypoglycemic medications between Type 2 diabetes patients with and without serious mental illness

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Abstract

Inadequate self-management of chronic medical conditions like Type 2 diabetes may play a role in the poor health status of individuals with serious mental illnesses. We compared adherence to hypoglycemic medications and blood glucose control between 44 diabetes patients with a serious mental illness and 30 patients without a psychiatric illness. The two groups did not differ in their ability to manage a complex medication regimen as assessed by a performance-based measure of medication management capacity. However, significantly fewer patients with a mental illness self-reported nonadherence to their hypoglycemic regimens compared to those without a mental illness. Although individuals with mental illnesses also had better control of blood glucose, this metabolic parameter was not correlated with adherence to hypoglycemic medications in either patient group. The experience of managing a chronic mental illness may confer advantages to individuals with serious mental illnesses in the self-care of co-occurring medical conditions like Type 2 diabetes.

Keywords

Schizophrenia; Mood disorder; Self-management

1. Introduction

The prevalence of co-occurring medical conditions such as Type 2 diabetes in individuals with schizophrenia and other serious mental illnesses (9–14%) is higher than that in the general population (Dixon et al., 2000) and likely contributes to the high mortality rates from natural causes such as cardiovascular disease in these patients (Brown et al., 2000; Osby et al., 2000; Colton and Manderscheid, 2006). Inadequate self-management of medical

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conditions, including not taking medications as prescribed, may contribute to the compromised health status of these patients. Studies in the general population with Type 2 diabetes have shown that poor adherence to hypoglycemic medications is associated with numerous adverse health consequences, including inadequate control of blood glucose (Schechter et al., 2002; Krapek et al., 2004; Ho et al., 2006; Rozenfeld et al., 2008), increased hospitalizations (Lau and Nau, 2004), increased healthcare costs (Sokol et al., 2005; Stuart et al., 2009), and possibly increased mortality (Ho et al., 2006). Although a large body of research has demonstrated that individuals with schizophrenia have difficulties adhering to antipsychotic medications (see reviews; Lacro et al., 2002; Byerly et al., 2007a) many fewer studies (Dolder et al., 2003; Dolder et al., 2005; Piette et al., 2007; Kreyenbuhl et al., 2010) have investigated whether adherence to medications for chronic medical conditions is similarly problematic, and no studies have examined whether nonadherence is associated with poor medical outcomes in these patients.

In one of the largest studies to date, we used administrative pharmacy records from a sample of over 20,000 US veterans to compare adherence to oral hypoglycemic medications between diabetes patients with versus without a schizophrenia-spectrum disorder. While the extent of nonadherence to oral hypoglycemics in both groups was substantial (43–52%), we found that individuals with schizophrenia demonstrated better adherence to their diabetes medications as assessed by the medication possession ratio (MPR) than those without schizophrenia (Kreyenbuhl et al., 2010). Given that even more objective measures of medication adherence such as the MPR have limitations and no single measure of medication adherence is considered a gold standard (DiMatteo, 2004), the purpose of the current study was to validate our somewhat unexpected findings in a different sample using an alternative measure of medication adherence. We also explored the relationship between adherence to diabetes medications and blood glucose control, in light of suggestive evidence that individuals with schizophrenia fare better than their non-mentally ill counterparts on this intermediate diabetes outcome (Dixon et al., 2004; Krein et al., 2006; Weiss et al., 2006).

2. Methods

2.1. Study sample and setting

The 74 participants in this study had taken part in an earlier investigation comparing the processes and outcomes of care for Type 2 diabetes between 201 individuals with a co-occurring serious mental illness (schizophrenia, schizoaffective, bipolar, or major depressive disorders) and a comparison group without a psychiatric illness ($n = 99$). Everyone who participated in the earlier study had a medical chart diagnosis of Type 2 diabetes, were 18 to 65 years of age, English-speaking, and were able to provide informed consent. By design, some individuals in the sample were those with a medical chart diagnosis of serious mental illness who were recruited from six public and private outpatient mental health clinics in urban and suburban communities across the Baltimore, Maryland metropolitan area. Other individuals in the sample were those without serious mental illness who were recruited from three primary care clinics proximal to the psychiatric clinics. A lack of mental illness was defined as no record of psychiatric treatment or medication in the patient's medical chart in the prior year. In the earlier study, all participants completed a baseline assessment consisting of a review of medical records and an interview where we obtained information on various aspects of their diabetes history and care, including prescribed treatments and services used, as well as diabetes knowledge, beliefs, and self-care activities. A more detailed description of the recruitment strategies and assessment procedures is provided elsewhere (Dixon et al., 2004).

The 74 participants in the current study were further drawn from the 95/201 individuals (47%) with a serious mental illness and the 44/99 individuals (44%) without mental illness

who completed a 5-year follow-up assessment of the original study. Among these 139 people, 128 (92%) expressed an interest in participating in the current study on diabetes medication adherence and were screened for eligibility. To be included in the current study, participants with serious mental illness had to be receiving one or more oral or injectable hypoglycemic medications prescribed routinely and at least one oral antipsychotic medication prescribed routinely; participants without mental illness had to be prescribed at least one hypoglycemic medication routinely. Among the 128 individuals considered for participation, 54 were not enrolled (45 did not meet eligibility criteria, 6 could not be reached during the study time frame, 2 had died, and 1 was in a nursing home). The remaining 74 (57% of 128) were enrolled in the study, and compared to those not enrolled, a larger proportion of participants were non-white and were high school graduates; the groups did not differ on any other demographic or diabetes-related characteristics. The Institutional Review Board of the University of Maryland School of Medicine approved the study, and all participants provided written informed consent to be interviewed and permitted a review of their medical records.

2.2. Data sources and measures

Between January 2006 and July 2007, all participants met with research staff for approximately 60 to 90 min to complete a medication adherence assessment. Participants were instructed to bring all currently prescribed medications, in either bottles or as a list. Research staff noted the name, dosage strength, and frequency of administration for all medications prescribed on a routine (i.e., not as needed) basis. We then determined the total number of medications prescribed, the number of hypoglycemic medications (oral or insulin) prescribed, and their directions for administration. Participants were also queried regarding whether they received any assistance from family members or other caregivers in administering their hypoglycemic medications.

Nonadherence to hypoglycemic medications, our primary dependent variable, was ascertained using the Brief Medication Questionnaire (BMQ) (Svarstad et al., 1999). For each hypoglycemic medication, participants were asked the following questions: In the past week, (1) How many days did you take your diabetes medicine? (2) How many times per day did you take your medicine? (3) How many pills did you take each time? (4) How many times did you miss taking the medicine? (5) Did you have any problems getting a refill of your medicine on time? Research staff compared participants' responses to these questions to the medication's directions for use, and participants who reported stopping the medicine due to a late refill or other reason, missing any doses, or consuming greater than the prescribed amount during the past week were considered nonadherent to that particular medication. For the primary analyses of nonadherence in this study, participants were considered 'nonadherent' if they self-reported not taking *any* of their hypoglycemic medications as prescribed over the past week.

We also used the BMQ to characterize potential barriers to hypoglycemic medication adherence. Participants who responded 'not at all' or who did not respond to the question, 'How well does your diabetes medication work for you?' or reported that their diabetes medication was bothersome in some way were considered to have a *motivation barrier* to adherence. Participants receiving hypoglycemic medications administered two or more times per day or who reported any difficulty remembering to take all prescribed doses were classified as having a *recall barrier* to adherence. Participants with an *access barrier* to adherence reported difficulties in either paying for their hypoglycemic medications or obtaining refills in a timely manner (Svarstad et al., 1999).

We used the Beliefs about Medication Questionnaire: Specific Version (BMQ-Specific) (Horne et al., 1999), to characterize patients' beliefs about the *necessity* of diabetes

medications for controlling the illness and their *concerns* about the adverse consequences of taking the medications. Respondents indicated their degree of agreement with a series of statements using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating stronger beliefs about the necessity of diabetes medications and greater concerns about adverse effects, respectively. The BMQ-Specific has satisfactory psychometric properties for use in individuals with severe mental disorders (Chronbach's alpha of 0.76 for the Concerns subscale and 0.90 for the Necessity subscale), with the constructs measured shown to be related to medication adherence in these patients (Jónsdóttir et al., 2009).

The performance-based Medication Management Ability Assessment (MMAA) was used to evaluate participants' capacity to manage a complex medication regimen (Patterson et al., 2002). For this role-play task, participants were presented with four mock medication bottles each labeled with a made-up medication name and directions for use. After a 1-hour delay, participants were asked to give the interviewer pills from each bottle as they should be taken throughout a typical day. Participants could refer to the directions on the bottles as needed throughout the task. For each medication, the interviewer recorded the number of pills and number of times per day the participant indicated each medication should be taken, as well as whether the medication should be taken with food, and calculated an error score representing the total number of deviations from the prescribed regimen.

Each participant also provided a blood sample via fingerstick for assessment of glycosylated hemoglobin (HbA1c), a biochemical marker of blood glucose control over the preceding 2–4 months. HbA1c was measured using the Bayer DCA 2000+. We also obtained information on participants' demographic and diabetes-related characteristics from the 5-year follow-up diabetes study interview and obtained from their baseline interview a measure of neurocognitive functioning, the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS). In this study, we used the total RBANS score, an age-adjusted standard score with a mean of approximately 100 and a standard deviation of approximately 15 (Randolph, 1998).

2.3. Data analyses

We first compared the demographic, clinical, diabetes-related, and hypoglycemic medication regimen characteristics between individuals with and without serious mental illness. We used t-tests for comparisons of continuous variables but for those variables with non-normal distributions, we used the nonparametric Wilcoxon rank sum test (equivalent to the Mann–Whitney U). We used chi-square tests for comparisons of categorical variables and Fisher's Exact Tests whenever there was a cell with expected count less than 5. We then used multivariable logistic regression analysis to evaluate differences in hypoglycemic nonadherence between the patient groups adjusting for the effects of potential confounding variables. Because of our limited sample size, we selected a parsimonious group of covariates thought or demonstrated to be related to medication adherence in previous research, which included age, neurocognitive functioning, prescription of insulin, total number of hypoglycemic medications prescribed, extent of supervision with medication administration, barriers to adherence, attitudes about the need for and concerns about taking hypoglycemic medications, and medication management ability. Finally, if initial analyses revealed differences in hypoglycemic adherence and HbA1c values between the patient groups and if the assumptions of a mediator analysis were met, we planned to explore whether the diagnosis of a serious mental illness mediated the relationship between hypoglycemic adherence and blood glucose control.

3. Results

3.1. Description of the samples

The demographic, clinical, and diabetes-related characteristics of the participants with serious mental illness ($n = 44$) and without serious mental illness ($n = 30$) are shown in Table 1. Among the 44 individuals with a serious mental illness, 70% ($n = 31$) were diagnosed with a schizophrenia-spectrum disorder and 30% ($n = 13$) had a major mood disorder. Eleven percent ($n = 5$) of these patients were hospitalized for their mental illness in the preceding six months. Individuals with a serious mental illness were younger than those in the comparison sample and were prescribed a greater number of medications overall. In addition, those with a serious mental illness scored predictably lower on neurocognitive functioning than those without a psychiatric disorder, and there was a trend towards there being a higher prevalence of smoking in the mental illness group ($P < 0.09$). The groups did not differ on body mass index or use of alcohol in the past 6 months (Table 1).

With regard to diabetes-related characteristics, duration of diabetes and utilization of inpatient and outpatient services for diabetes in the prior 6 months did not differ between the groups. We were able to obtain measures of glucose control as assessed by HbA1c from 82% ($n = 36$) of participants with serious mental illness and 80% ($n = 24$) of participants without serious mental illness. As observed in the initial diabetes study from which the participants in the current study were recruited (Dixon et al., 2004), individuals with a serious mental illness in this study had better glucose control as assessed by HbA1c than those without serious mental illness (Table 1).

3.2. Medication-related characteristics

Whereas similar proportions of both groups were prescribed at least one oral hypoglycemic medication or insulin, those with serious mental illnesses were treated with fewer diabetes medications on average, compared to those without mental illness (Table 2). The majority of both groups received hypoglycemic regimens that included medications administered two or more times daily, and less than half of both groups received any assistance from others administering their medications. Further, similar proportions of both groups reported potential barriers to adhering to their hypoglycemic medications, with approximately one-quarter to one-third of patients citing barriers related to low motivation, difficulty remembering to take their medications, and problems obtaining their medications in a timely fashion. Both groups expressed similar positive attitudes about the need for hypoglycemic medications for controlling their diabetes and a similar moderate level of concern about the potential adverse consequences of taking the medications (Table 2).

There were no statistically significant differences between the groups in the number of errors made on the Medication Management Ability Assessment (MMAA), the role play task used to evaluate the ability of participants to successfully manage a hypothetical daily regimen of four medications. On average, individuals with serious mental illnesses made 8.4 (± 7.9) errors on the task compared to 6.0 (± 6.3) errors made by those without a mental illness ($t = 1.38$; d.f. = 71; $P = 0.17$).

3.3. Nonadherence to hypoglycemic medications

In unadjusted comparisons, a significantly smaller proportion of individuals with serious mental illness (27%) self-reported nonadherence to any of their hypoglycemic medications in the past week compared to diabetes patients without mental illness (60%) ($\chi^2 = 7.9$; d.f. = 1; $P = 0.005$). In multivariable analysis, those with a serious mental illness were 82% less likely to self-report nonadherence to any of their hypoglycemic medications than those

without a serious mental illness, when adjusting for potentially confounding factors (Table 3).

3.4. Relationship between adherence to hypoglycemic medications and blood glucose control

As presented above, both HbA1c values and nonadherence to hypoglycemic medications were significantly lower among individuals with a serious mental illness relative to those without psychiatric illness. As such, we sought to determine whether better control of blood glucose in those with serious mental illness was related to their greater adherence to hypoglycemic medications. However, adherence to hypoglycemic medications was not significantly correlated with HbA1c in either sample, and thus the assumptions of a mediator analysis were not met. Among individuals with a serious mental illness, HbA1c values were similar for those who did ($7.6 \pm 1.8\%$) and did not (7.4 ± 1.8) self-report nonadherence to any of their hypoglycemic medications in the past week ($t = 0.32$, $P = 0.75$). Similarly, among those without a mental illness, HbA1c values did not differ between those who did (9.0 ± 2.2) and did not (9.0 ± 2.5) report hypoglycemic nonadherence ($t = -0.03$, $P = 0.98$).

4. Discussion

The findings from this study support a growing body of research that suggests that individuals with serious mental illnesses do not fare worse than individuals without psychiatric conditions with regard to their adherence to prescribed medications for chronic medical conditions such as Type 2 diabetes. The results of the current study, which used a self-reported measure of adherence, are consistent with our earlier study of US veterans with diabetes that showed that fewer individuals with schizophrenia (43%) were nonadherent to their oral hypoglycemic medications relative to a non-mentally ill comparison sample (52%) (Kreyenbuhl et al., 2010). In that study, we used a more objective measure of medication adherence, the medication possession ratio, to determine the proportion of patients having less than 80% of needed medications available based on pharmacy refill records. Taken together, the results of these two studies suggest that individuals with serious mental illnesses may have better medication adherence than individuals without mental illnesses who have Type 2 diabetes and are not uniquely compromised in their ability to self-manage a chronic medical condition. Of note, Himelhoch et al. (2009) reported that individuals with a serious mental illness and co-occurring HIV were less likely than a non-mentally ill comparison sample to discontinue their medications, suggesting that our study findings may extend to other complex medical conditions that many psychiatric patients manage on a day-to-day basis.

Overall, those with serious mental illness in this study exhibited superior adherence even when differences between the groups in the number of hypoglycemic medications prescribed as well as other known risk factors for nonadherence were accounted for, including younger age and poorer neurocognitive functioning. Although cognitive impairments as measured by the RBANS were more pronounced in the patients with mental illnesses, their ability to manage a typical medication regimen as assessed by a performance-based measure of medication management capacity, the MMAA, did not differ from those without psychiatric disorders. In previous studies, individuals with serious mental illnesses have generally performed worse on the MMAA than control patients (Patterson et al., 2002; Depp et al., 2008) with impaired cognition being associated with poorer performance on the task (Patterson et al., 2002; Jeste et al., 2003; Depp et al., 2008; Heinrichs et al., 2008). To our knowledge, this is the first study to administer the MMAA to patients with and without mental illnesses who also have Type 2 diabetes, which is known to be associated with cognitive dysfunction (Dickinson et al., 2008). Of note, the non-seriously mentally ill comparison sample was meaningfully cognitively impaired, scoring more than one standard

deviation below what would be expected in the general population adjusted for age (i.e., a score of 100 ± 15 on the RBANS). Thus, the extent of the cognitive impairment in the non-mentally ill diabetes patients in this study may have attenuated some of the expected differences in performance on the MMAA between the two groups.

The two patient groups also did not differ on other characteristics associated with nonadherence that may have explained our findings, including motivational, recall, and access barriers to adherence, attitudes regarding the necessity of diabetes medications or concerns about adverse effects, or whether patients received any assistance from others administering their medications. It may be that taking medications on an ongoing basis for a persistent mental illness provides a structure for medication taking that extends to somatic medications for another persistent condition such as diabetes. It has also been hypothesized that more consistent contact with the health care system as a result of interactions with mental health providers may be beneficial for patients with serious mental illnesses in improving the care of physical health problems, including taking medications as prescribed (Himelhoch et al., 2009). Although diabetes-related inpatient and outpatient service use did not differ between the groups in this study, we did not collect detailed information on utilization of mental health services by the mentally ill participants in order to evaluate this hypothesis. Additional research is needed to determine whether the recent focus of attention on the physical health of persons with mental illnesses by mental health providers (Dixon et al., 2007) has translated into improved health behaviors and subsequent outcomes in these patients.

Consistent with previous studies (Dixon et al., 2004; Krein et al., 2006; Weiss et al., 2006), we found that diabetes patients with serious mental illnesses in our study had better control of blood glucose than those in the comparison sample. However, we did not find HbA1c values to be higher in patients in either group who reported nonadherence to their hypoglycemic medications compared to those who reported taking their hypoglycemics as prescribed. While some studies using self-report measures of adherence have reported associations between adherence to diabetes medications and blood glucose control (Krapek et al., 2004; Hill-Briggs et al., 2005), others (Wooldridge et al., 1992; Hays et al., 1994; Grant et al., 2003) have not. Studies employing more objective measures of diabetes medication adherence, which also tend to have larger sample sizes, have more consistently observed this association (Schechtman et al., 2002; Ho et al., 2006; Rozenfeld et al., 2008). Although our small sample size may have limited our ability to detect the effect of self-reported medication adherence on blood glucose control in either of the groups we studied, it is also likely that a host of other factors, including the duration and severity of diabetes, body mass index, extent of physical activity, and nutritional habits, played an important and perhaps more pronounced role than adherence in determining metabolic status. It should also be noted that with average glycosylated hemoglobin values exceeding 7% in all patients, neither group would be considered to have well controlled diabetes, indicating that all patients in this study were in need of better diabetes treatment.

This study has several limitations. The self-report measure we used in this study may have produced overestimates of hypoglycemic adherence in both patient groups. While a meta-analysis of studies in non-psychiatric patients suggests that self-report measures of medication adherence do not produce estimates that are grossly inflated (DiMatteo, 2004), studies of adherence to antipsychotic medications in individuals with serious mental illnesses have questioned the validity of self-report measures in this population (Byerly et al., 2007b; Velligan et al., 2007). However, concerns about the validity of self-reported hypoglycemic adherence by individuals with psychiatric disorders in this study are mitigated to some extent by the consistency of the findings with our previous research using a larger sample and a more objective measure of adherence (Kreyenbuhl et al., 2010). The

generalizability of our findings from the current study may also be limited due to the relatively small sample comprised of individuals willing to participate in a follow-up study from an earlier investigation of diabetes self-management and outcomes. While it is possible that individuals adherent to their medication regimens would more readily agree to participate in this study than those who were nonadherent, any such selection bias would likely apply to both study groups.

Although chronic medical illness is common in individuals with serious mental illnesses, this is one of the few studies to evaluate how these patients co-manage medications for these conditions. We found that individuals with serious mental illnesses are not specifically disadvantaged with regard to self-management of a chronic medical condition such as Type 2 diabetes. Whether the experience of managing a chronic mental illness confers advantages to individuals with serious mental illnesses in the self-care of co-occurring medical conditions merits further attention.

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Table 1

Characteristics of diabetes patients with and without serious mental illness.

<i>Demographic/clinical characteristics</i>	Serious mental illness (<i>n</i> = 44)	No serious mental illness (<i>n</i> = 30)	Statistic	Degrees of freedom	<i>P</i> value
Age (mean ± S.D.), years	51.1 (9.3)	56.7 (7.9)	<i>t</i> = -2.70	72	0.009
Gender, % female	55% (<i>n</i> = 24)	57% (<i>n</i> = 17)	$\chi^2 = 0.03$	1	0.86
Race, % non-Caucasian	41% (<i>n</i> = 18)	20% (<i>n</i> = 6)	$\chi^2 = 3.56$	1	0.06
% High school education or higher	71% (<i>n</i> = 31)	80% (<i>n</i> = 24)	$\chi^2 = 0.85$	1	0.36
Body Mass Index (mean ± S.D.)	32.3 (7.4)	34.9 (8.8)	<i>t</i> = -1.39	72	0.17
% Currently smoking	51.2%	31.0%	$\chi^2 = 2.86$	1	0.09
% Used alcohol 1 time per week, past 6 months	6.7%	4.6%	-	-	1.00 ^a
Total number of medications prescribed (mean ± S.D.)	10.3 (3.4)	7.9 (4.3)	<i>t</i> = 2.63	72	0.01
Total RBANS score (mean ± S.D.)	71.8 (16.9)	81.8 (15.5)	<i>t</i> = -2.58	72	0.01
<i>Diabetes-related characteristics</i>					
Duration of diabetes (mean ± S.D.), years	12.8 (6.4)	13.0 (7.2)	<i>t</i> = -0.16	72	0.88
Number of outpatient diabetes visits (mean ± S.D.), past 6 months	2.6 (2.8)	2.5 (2.1)	<i>Z</i> = 0.64 ^b	-	0.52
% Hospitalized for diabetes, past 6 months	5% (<i>n</i> = 2)	13% (<i>n</i> = 4)	-	-	0.22 ^a
HbA1c (mean ± S.D.), %	7.4 (1.8)	9.0 (2.3)	<i>t</i> = -2.98	58	0.004

Note: Sample sizes vary for some variables due to missing values.

^aResults of a Fisher's Exact test.

^bResults of a Wilcoxon rank sum test.

Table 2
Hypoglycemic medication regimen characteristics of diabetes patients with and without serious mental illness.

	Serious mental illness (n = 44)	No serious mental illness (n = 30)	Statistic	Degrees of freedom	P value
% prescribed any oral hypoglycemic medication	86% (n = 38)	90% (n = 27)	-	-	0.73 ^a
% prescribed any insulin	36% (n = 16)	47% (n = 14)	$\chi^2=0.79$	1	0.38
Total number of hypoglycemic medications prescribed (mean $\pm$ S.D.)	1.8 (0.8)	2.3 (0.9)	$t=-2.73$	72	0.008
% prescribed any hypoglycemic medication 2 times per day (versus once daily)	80% (n = 35)	83% (n = 25)	$\chi^2=0.17$	1	0.68
% receiving some supervision with hypoglycemic medication administration (versus fully independent)	37% (n = 16)	40% (n = 12)	$\chi^2=0.06$	1	0.81
<i>Barriers to hypoglycemic medication adherence</i>					
% with motivation barrier	27% (n = 12)	37% (n = 10)	$\chi^2=0.73$	1	0.39
% with recall barrier	75% (n = 33)	83% (n = 25)	$\chi^2=0.73$	1	0.39
% with access barrier	11% (n = 5)	23% (n = 7)	-	-	0.21 ^a
<i>Attitudes towards hypoglycemic medications</i>					
Home Specific Necessity Scale score (mean $\pm$ S.D.) ^b	4.3 (0.9)	3.9 (0.8)	$t=1.72$	71	0.09
Home Specific Concerns Scale score (mean $\pm$ S.D.) ^c	2.6 (1.0)	2.4 (0.6)	$t=1.20$	71	0.24

Note: Sample sizes vary for some variables due to missing values.

^aResults of a Fisher's Exact test.

^bAs measured by a Likert scale. Possible scores range from 1 to 5, with higher scores indicating stronger beliefs about the necessity of the prescribed medication for controlling the illness.

^cAs measured by a Likert scale. Possible scores range from 1 to 5, with higher scores indicating greater concerns about the adverse consequences of taking the medication.

Table 3

Multivariable analysis of hypoglycemic medication nonadherence in diabetes patients with and without serious mental illness.

Variable	AOR	95% CI	P
Serious mental illness	0.18	(0.04–0.82)	0.03
Age	0.99	(0.92–1.07)	0.83
Total RBANS score	1.01	(0.96–1.06)	0.76
Prescribed insulin	0.90	(0.23–3.48)	0.87
Total number of hypoglycemic medications prescribed	1.21	(0.50–2.93)	0.67
Fully independent with hypoglycemic medication administration	0.18	(0.05–0.68)	0.01
Motivation barrier to hypoglycemic medication adherence	3.05	(0.76–12.22)	0.12
Recall barrier to hypoglycemic medication adherence	4.07	(0.69–24.06)	0.12
Access barrier to hypoglycemic medication adherence	1.34	(0.22–8.31)	0.75
Horne Specific Necessity Scale score	0.80	(0.35–1.82)	0.59
Horne Specific Concerns Scale score	1.27	(0.55–2.94)	0.57
MMAA total errors	1.06	(0.96–1.18)	0.26