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Adherence to common cardiovascular medications in patients with schizophrenia vs. patients without psychiatric illness

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ABSTRACT

Objective: The purpose of the study was to examine whether individuals with diagnoses of schizophrenia were differentially adherent to their statin or angiotensin-converting enzyme inhibitor/angiotensin receptor blocker (ACEI/ARB) medications compared to individuals without psychiatric illness.
Method: Using electronic medical record data across 13 Mental Health Research Network sites, individuals with diagnoses of schizophrenia or schizoaffective disorder receiving two or more medication dispensings of a statin or an ACEI/ARB in 2011 ($N=710$) were identified and matched on age, sex and Medicare status to controls with no documented mental illness and two or more medication dispensings of a statin in 2011 ($N=710$). Medication adherence, and sociodemographic and clinical characteristics of the study population were assessed.
Results: Multivariable models indicated that having a schizophrenia diagnosis was associated with increased odds of statin medication adherence; the odds ratio suggested a small effect. After adjustment for medication regimen, schizophrenia no longer showed an association with statin adherence. Having a schizophrenia diagnosis was not associated with ACEI/ARB medication adherence.
Conclusions: Compared to patients without any psychiatric illness, individuals with schizophrenia were marginally more likely to be adherent to their statin medications. Given that patterns of adherence to cardioprotective medications may be different from patterns of adherence to antipsychotic medications, improving adherence to the former may require unique intervention strategies.

1. Introduction

Schizophrenia is a chronic, serious mental illness (SMI) characterized by psychosis, hallucinations, delusions, or disorganized speech and behavior. Approximately 2.4 million adults (1.1%) in the United States have schizophrenia in any given year [1]. The mortality rate among individuals with schizophrenia is two to four times greater than that in the general population due in part to higher rates of chronic disease such as cardiovascular disease, diabetes mellitus, hypertension and hyperlipidemia [2–4]. Higher rates of behavioral risk factors such as smoking [5], sedentary lifestyle [6] and poor dietary habits [6] as well as insufficient medical care [7] coupled with antipsychotic medication use (linked to metabolic problems including obesity, diabetes, dyslipidemia and cardiovascular disease) [8,9] contribute to early morbidity and mortality. Thus, personal (behavior, disease states, medication adherence), health care (utilization, medication prescription) and environmental (shelter, safety, etc.) factors all contribute to mortality in the underlying conceptual model.

Another possible explanation for higher mortality rate among individuals with schizophrenia, compared to the general population, may be that they are less likely to be adherent to prescribed medications compared to individuals without psychiatric conditions [10]. For example, prior research suggests that nonadherence to oral antipsychotic medications may be extremely common; some reports indicate that approximately 50% of individuals with schizophrenia do not take antipsychotic medications as prescribed [11–13]. Nonadherence to antipsychotic medications can have profound health implications, as evidence suggests that deviations from treatment can result in psychotic relapse, emergency department (ED) visits and rehospitalization [14,15]. Moreover, medication nonadherence may not be limited to antipsychotics; evidence suggests that nonadherence among individuals with schizophrenia is also problematic for other classes of medications,

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including those for hypertension and hyperlipidemia [16]. For example, Piette and colleagues found that patients with schizophrenia had poorer adherence to their hypoglycemic and antihypertensive regimens than to their antipsychotic medications [17]. Thus, nonadherence to these regimens could impact mortality via its effect on cardiovascular risk factor control. Few studies, however, have specifically compared rates of nonpsychiatric medication adherence between persons with versus without psychotic disorders; the studies that have been published thus far report mixed results. For example, three studies suggest that individuals with a diagnosis of schizophrenia do not differ in their hypoglycemic medication adherence [10] or antihypertensive medication adherence [18,19] from those without any psychiatric illness. By contrast, another study reported that individuals with schizophrenia were more likely to be adherent to hypoglycemic medications compared to those without schizophrenia [20]. These studies were limited by small sample sizes or were conducted among military veterans within the Veterans Health Administration system. Thus, findings may not be generalizable to nonveteran populations because patients eligible for care in the Veterans Administration tend to be sicker and poorer than other veterans and US residents in general [21]. Therefore, the purpose of the present study was to examine whether individuals with diagnoses of schizophrenia were differentially adherent to their antihyperlipidemic (statin) and/or antihypertensive [angiotensin-converting enzyme inhibitor/angiotensin receptor blocker (ACEI/ARB)] medications compared to individuals without any psychiatric illness. Analyses were completed using data from health care systems in the Mental Health Research Network and are representative of a large, geographically and racially/ethnically diverse population across the United States.

2. Material and methods

2.1. Overview

The Mental Health Research Network (MHRN) is a consortium of research centers located within 13 large health care systems, many of which also have affiliated health insurance plans. These integrated payer–provider systems are part of the larger Health Care Systems Research Network formerly known as the Health Maintenance Organization Research Network, which includes 17 US-based health system members. MHRN-participating health systems serve over 12.5 million individuals across 15 states with diverse populations. All HSCRN sites maintain a Virtual Data Warehouse consisting of electronic medical record (EMR) and insurance claim data for all of their enrolled HMO members or patients. Data on encounters, pharmacy fills, diagnoses, medical tests, demographics and costs are organized using the same definitions across sites and are quality checked locally [22].

The current study involved seven MHRN systems. These sites were Group Health Cooperative (Washington), HealthPartners (Minnesota), Henry Ford Health System (Michigan), Scott & White Healthcare (Texas), Kaiser Permanente Georgia, Kaiser Permanente Hawaii and Kaiser Permanente Northwest (Oregon). Institutional Review Boards at each site approved data use for this project.

2.2. Study sample

Cases were defined as follows: adults aged 18–70 years (at least 18 years by January 1, 2010) with schizophrenia [*International Classification of Diseases, Ninth Revision* (*ICD-9*) 295.0–295.4, 295.6, 295.8–295.9] or schizoaffective disorder (*ICD-9* 295.7) diagnosed on at least two dates (one of which had to occur in 2010) during a mental health care encounter or by a mental health care provider, and receiving two or more medication dispensings of either a statin or an ACEI/ARB in 2011 (N= 710). Eligible individuals had to have continuous health plan membership throughout the observation period (but could have a gap in enrollment records of ≤30 days). Two or more fills of *any* statin or an ACEI/ARB were included, as clinicians may try different medications within a drug class while seeking a particular patient's optimal response. Typically, once patients are prescribed medication for diabetes and/or hypertension, providers may change the medication but rarely decide to discontinue that medication altogether. Therefore, consistent with approaches used in prior research [17], we assumed that patients should be refilling the medication throughout the observation period.

Controls were identified using the same criteria as described above except that they had no documented mental illness diagnoses during 2010 (N= 710). Cases were matched on age, sex and Medicare status using stratified random sampling. It was not possible to match on Medicaid status because not all study sites enroll Medicaid members.

2.3. Measures

Medication adherence was assessed using Medication Possession Ratio (MPR), a measure of the proportion of time that an individual has medication available for use. It is calculated by dividing the sum of the days' supply of a medication obtained over an observation period by the days' supply needed if the patient was taking a full dose of the medication continuously during the observation period. The start of the observation period in the present study was the date of the first medication dispensing in 2011, and the end of the observation period was December 31, 2011, or until the medication was discontinued by the provider. We considered an MPR of ≥0.80 adherent, consistent with other studies [23,24]. If an individual was taking both a statin and an ACEI/ARB, his/her adherence was calculated separately for each.

We also examined sociodemographic (age, sex, race/ethnicity, neighborhood socioeconomic status) and clinical characteristics of the study population using data from 2010 to 2011. Age, sex and race/ethnicity were ascertained based on data available in the EMR as of 1/1/2011. Low neighborhood socioeconomic status was defined as having >20% of households below federal poverty level, calculated using patient addresses as of 1/1/2011 and census block data from the 2000 census. Uncontrolled systolic blood pressure (SBP) was defined as having at least two readings on different dates of an SBP >140 mmHg, and uncontrolled low-density lipoprotein (LDL) cholesterol was defined as having an average LDL of >130 mg/dl. Both SPB and LDL data were calculated using the average of any recorded readings during 2010 and 2011. Body mass index (BMI) identified patients who were overweight (BMI of 25–29.9) or obese (BMI of 30+); data were calculated using the average of any recorded assessment during 2010 and 2011. Overall medical comorbidity burden was calculated using the Charlson Comorbidity Index Score (CCIS). This score contains 19 categories of comorbidity, with each category weighted based on the adjusted risk of 1-year postdischarge mortality. The overall comorbidity score reflects the cumulative increased likelihood of 1-year mortality; the higher the score, the more severe the burden of comorbidity [25]. CCIS data were calculated using data from 2010. The complexity of an individual's medication regimen was calculated by obtaining the number of American Society of Health-System Pharmacists medication groups filled during 2011. Health care utilization (hospitalizations, ED visits and other in-person outpatient encounters) was based on summarized data from the last 6 months of 2011. Because we were interested in counting utilization days, multiple outpatient encounters documented on the same day were counted only once.

Preliminary data comparisons across sites were made by the study team to investigate site variation and to ensure accuracy of the data before creating aggregated estimates. This preliminary comparison found very little site variation, supporting the stability of the aggregated estimates.

2.4. Analyses

The primary goals of our analyses were to examine whether having a diagnosis of schizophrenia or schizoaffective disorder was associated with statin or an ACEI/ARB medication adherence as well as to estimate the effect of other patient-specific covariates on adherence. For initial