Clozapine Utilization and Outcomes by Race in a Public Mental Health System: 1994–2000

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Objective: This study aimed to assess racial differences in clozapine prescribing, dosing, symptom presentation and response, and hospitalization status. This study extends previous studies of clozapine by examining patient- and treatment-related factors that may help explain or eliminate reasons for differential prescribing.

Method: Clozapine records for 373 white and African American patients with schizophrenia or schizoaffective disorder treated between March 1, 1994, and December 31, 2000, in inpatient mental health facilities in the state of Maryland were examined. Records for this study were derived from 3 state of Maryland databases: the Clozapine Authorization and Monitoring Program, the State of Maryland Antipsychotic Database, and the Health Maintenance Information System Database.

Results: A total of 10.3% of African Americans (150/1458) with schizophrenia received clozapine treatment compared with 15.3% of whites (223/1453) ($\chi^2 = 16.74$, df = 1, $p < .001$) during inpatient treatment in the public mental health system in Maryland. Clozapine doses were lower in African Americans relative to whites (385.3 ± 200.6 vs. 447.3 ± 230.3 mg/day) ($t = -2.66$, df = 366, $p = .008$). At the time of clozapine initiation, whites had more activating symptoms as measured by the Brief Psychiatric Rating Scale (BPRS) ($t = -3.98$, df = 301, $p < .0001$); however, African Americans had significantly greater improvements in BPRS total symptoms ($F = 4.80$, df = 301, $p = .03$) and in anxiety/depressive symptoms during 1 year of treatment with clozapine ($F = 10.04$, df = 303, $p = .002$). The estimated rate of hospital discharge was not significantly different for African Americans compared to whites prescribed clozapine (log-rank $\chi^2 = 0.523$, df = 1, $p = .470$); however, African Americans were more likely than whites to discontinue clozapine during hospitalization (log-rank $\chi^2 = 4.19$, df = 1, $p = .041$).

Conclusion: Our data suggest underutilization of clozapine in African American populations. This racial disparity in clozapine treatment is of special concern because of the favorable outcomes associated with clozapine in treatment-resistant schizophrenia and in the specific benefits observed in African American patients. More research is needed to determine why disparities with clozapine treatment occur and why African Americans may be discontinued from clozapine at a higher rate, despite potential indicators of equal or greater effectiveness among African Americans compared with whites.

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Schizophrenia is a debilitating illness that affects approximately 1% of the population worldwide. While the prevalence of schizophrenia does not vary by race or ethnicity,[1] previous research has revealed significant racial disparities in both the use of mental health services by patients with schizophrenia and the types of medication treatments prescribed to them.[2] For example, several studies have shown that whites are more likely than African Americans to use outpatient mental health services and individual therapy for schizophrenia care.[3–5] Whites with schizophrenia are 2 times more likely than African Americans to receive a referral to aftercare following hospital discharge.[6]

Numerous studies have demonstrated racial differences in the prescription of antipsychotic medications for schizophrenia. For example, African Americans are more likely than whites to be prescribed long-acting injectable antipsychotic medications as well as excessive doses of high-potency conventional antipsychotics.[7–10] Most studies have also shown that African Americans are less likely

than white patients to be prescribed second-generation antipsychotic (SGA) medications.[11–16] However, studies with more recent data suggest that this gap might be narrowing.[17,18]

Of all the SGA medications, clozapine deserves unique consideration, because it has been in use for the longest period of time, is typically reserved for patients who are the most severely ill, and has the strongest evidence for efficacy in patients who are otherwise treatment resistant.[19] Nevertheless, clozapine is reportedly underused in the United States, particularly among African Americans.[20] In a U.S. Medicaid population, Kuno and Rothbard[12] observed that African Americans were less likely to receive a prescription for clozapine compared to whites. Moreover, Copeland et al.[13] reported that African Americans and Hispanics were one third as likely to be prescribed clozapine relative to whites in a large Veterans Affairs population (N > 69,000). Recently, Mallinger et al.[21] also reported that, after controlling for clinical and sociodemographic variables, whites were significantly more likely to be prescribed clozapine as compared to African Americans.

To date, explanations for the underutilization of clozapine among African Americans have not been well characterized, but may include such factors as prescriber bias or beliefs that African Americans may be nonadherent to the treatment itself or to its blood cell monitoring requirements. Clinicians may also perceive that African American patients are less likely to respond to clozapine, a notion that may be bolstered by a lack of evidence for its efficacy in minority populations due to their underrepresentation in clinical trials. In addition, there have been reports of lower counts of white cells and leukocytes due to blood cell margination in African Americans versus whites in normal populations. This, in turn, may be perceived as a higher risk for clozapine-related agranulocytosis; however, there is no evidence of differential rates of this adverse effect occurring by race.[22,23]

The purpose of this study was to examine racial differences in the prescription of clozapine within the public inpatient mental health system in Maryland. We examined differences in prescribing and dosing of clozapine as well as differences in symptom presentation, treatment response, and hospitalization status among racial groups with schizophrenia or schizoaffective disorder. This study extends previous studies of clozapine by examining patient- and treatment-related factors that may help explain or eliminate reasons for differential prescribing.

METHOD

Overview

Detailed records of all patients who received clozapine as an inpatient in the state of Maryland public health system between March 1, 1994, and December 31, 2000, were examined. We first compared the rates of clozapine treatment between African American and white patients with a diagnosis of schizophrenia or schizoaffective disorder in the hospital system during that time. We then compared the treatment characteristics and outcomes of whites and African Americans who received clozapine treatment. Records for this study were derived from 3 state of Maryland databases described below: The Clozapine Authorization and Monitoring Program (CAMP), the State of Maryland Antipsychotic Database, and the Health Maintenance Information System Database (HMIS). This study was approved by the University of Maryland and state of Maryland Institutional Review Boards.

The Clozapine Authorization and Monitoring Program

At the direction of the Mental Hygiene Administration in Maryland, a statewide approach to clozapine use was mandated for the public sector and was administered by CAMP. This system for clozapine use and monitoring was utilized from 1989 through 2000.

The guidelines for clozapine utilization required that patients meet the diagnostic criteria for DSM-IV schizophrenia, schizoaffective disorder, or psychotic disorder not otherwise specified. The prescriber was required to document evidence that the patient was "treatment resistant." Patients were considered treatment resistant if they had 2 unsuccessful trials of at least 2 different chemical classes of antipsychotic agents. The patient must have had a score of 35 or greater on the 20-item Brief Psychiatric Rating Scale (BPRS) or a BPRS score of at least 4 (on a 7-point scale) in 1 of the following BPRS categories: emotional withdrawal, conceptual disorganization, suspiciousness, hallucinatory behavior, unusual thought content, poverty of thought, or inappropriate affect. Exclusion criteria for clozapine prescribing included any history of a drug-induced blood dyscrasia, uncontrolled seizure disorder, a white blood cell count of less than 3500 per mm^3, history of a myeloproliferative disorder, pregnancy, and age less than 16 years. Clozapine guidelines included routine monitoring of white blood cell counts that were verified each week by a clinical pharmacist and the treating clinician; however, these counts were not electronically maintained. Dosing guidelines were available for all clinicians with recommendations for titration (starting maximum dose of 12.5 mg b.i.d., 50-mg/day increments in the first 2 weeks, and 100-mg/day increments by week thereafter) and a recommended maximum dose of 900 mg/day.

Prior to clozapine initiation, a prescriber was required to register with the CAMP office and asked to provide a 20-item BPRS score to document baseline psychopathology. Statewide educational programming, which included training on BPRS ratings and anchors, was provided to physicians who were prescribing clozapine. In addition to the baseline BPRS score, the treating physician was also

asked to submit BPRS ratings at 3, 6, 9, and 12 months and every 6 months thereafter. The BPRS ratings submitted to the CAMP system were used for this study.

The State of Maryland Antipsychotic Database

In 1994, Maryland established a data collection system to track antipsychotic medication dosing trends and hospitalization status of all patients in public psychiatric inpatient facilities treated with SGAs. Patients admitted to state psychiatric facilities are predominately uninsured or on medical assistance and are generally more severely impaired and in need of longer hospitalizations than those treated in other settings. All adult state psychiatric inpatient facilities were mandated to send medication usage information and hospitalization data to the University of Maryland School of Pharmacy for all patients initiated on SGAs. This task was performed by the Director of Pharmacy from each facility, based on computerized medication orders. This database contains patient characteristics (age, race, sex, diagnosis), hospital admission and discharge dates, and prescription records for second-generation antipsychotic medications, including type of medication (clozapine, risperidone, olanzapine, quetiapine, ziprasidone, and aripiprazole), its dosage, and dates of initiation and discontinuation. These data allowed us to derive length of inpatient stay prior to initiating clozapine, number of days to reach stabilized dose, and mean total daily clozapine dose. Stabilized dose was considered to be the dose prescribed for the greatest number of hospital days. Data on conventional antipsychotics or concomitant medications were not collected. This study utilized data on patients who received at least 1 prescription for clozapine during the study period. Diagnoses were verified by individual treatment team notes.

Health Maintenance Information System Database

This statewide database includes admission and discharge records for all psychiatric hospitalizations occurring in the state system. This database was used to determine the number of unique patients admitted to the state hospitals with a diagnosis of schizophrenia or schizoaffective disorder during the same period under study (March 1, 1994, to December 31, 2000). The information collected from HMIS also includes the race and gender of all admitted patients.

Sample Selection and File Merging

Our study sample included all inpatients with a diagnosis of schizophrenia or schizoaffective disorder in the Maryland Antipsychotic Database who were prescribed clozapine during the study period and who were either white (N = 223) or African American (N = 150). A total of 20 patients were excluded because they were of other races and constituted too small a sample to analyze. Of note, only 11 patients who received clozapine did not have a diagnosis of schizophrenia or schizoaffective disorder. Only the most recent clozapine trial was included when patients had more than 1 trial. The sample of 373 patients was merged with the CAMP database to obtain baseline and 3-, 6-, and 12-month BPRS ratings. Scores and factors were assessed using only the first 18 items[1–7] of the BPRS. Factors from the BPRS included positive symptoms, negative symptoms, hostility, anxiety and depression, and activation.[24] If any item on the BPRS was missing or coded as a 9, the BPRS was not included in the analysis. The amount of missing baseline data was limited to 18.8% of the sample (70/373). In order to receive clozapine, a baseline BPRS was completed, and the score was verified; however, the missing data are due to some items being left blank. Subjects with missing BPRS items at baseline did not significantly differ from those with complete data regarding age, mean clozapine dose, or time in the hospital prior to receiving clozapine.

Analytic Plan

The proportion of African Americans and whites receiving clozapine during the study period among those who were admitted to the state hospital system in Maryland were compared using a χ^2 test. The relative risk (and 95% CI) of clozapine treatment was also calculated. To compare the demographic and baseline clinical characteristics of African Americans and whites and the course of clozapine treatment among those prescribed clozapine, we used χ^2 test to assess differences in categorical variables (gender) and independent t tests for continuous variables (age, length of hospital stay before clozapine treatment, baseline BPRS score, and amount of time it took to reach the maximum stabilized dose [i.e., dose maintained for the longest period of treatment]).

The change in the total BPRS scores and subfactors (positive symptoms, negative symptoms, hostility, anxiety/depression, and activation)[24] for 12-month data were examined by computing mixed-effects regression models (PROC MIXED in SAS version 9.1, SAS Institute, Cary, N.C.) with subject and facility being treated as random effects and baseline BPRS scores, mean clozapine dose, racial group (African Americans, whites), time, and the time-by-group interaction included as fixed effects.

Time to hospital discharge and clozapine discontinuation were compared across the 2 racial groups with Kaplan-Meier survival curves, and a log-rank χ^2 test was used to evaluate if they differed. Subjects still in the hospital at study end were censored (December 31, 2000); all other subjects who discontinued clozapine were censored at the date of discontinuation for the time-to-discharge analysis. The beginning point for counting time to discharge was the initiation of clozapine. Patients who were treated in the forensic unit (N = 96) were not included in the discharge analysis nor were those with missing dates for hospital discharge

Table 1. A Comparison of Demographic and Baseline Clinical Characteristics by Race of Inpatients Prescribed Clozapine in Maryland (1994–2000)

Variable	White (N = 223)	African American (N = 150)	Statistic
Age, mean (SD), y	41.8 (9.7)	40.5 (9.3)	t = –1.32, df = 370, p = .187
Female, % (N/N)	29 (63/216)	29 (43/149)	χ^2 = 0.004, df = 1, p > .05
Length of stay prior to clozapine initiation, mean (SD), d	970.8 (1400.5)	1136.5 (1602.8)	t = –0.93, df = 303, p = .355
Clozapine dose, mean (SD), mg/d	447.3 (230.3)	385.3 (200.6)	t = –2.66, df = 366, p = .008
Time to reach stabilized dose, mean (SD), d	451.1 (596.3)	413.8 (605.1)	t = –0.58, df = 358, p = .56
Baseline BPRS score, mean (SD)[a,b]			
Total	63.4 (16.1)	59.7 (16.6)	t = –1.97, df = 300, p = .00498
Positive symptoms	13.6 (4.6)	13.9 (3.9)	t = 0.58, df = 286, p = .566
Negative symptoms	10.3 (4.1)	9.8 (4.5)	t = –0.84, df = 300, p = .400
Anxiety/depression	12.3 (5.1)	11.1 (4.6)	t = –1.82, df = 301, p = .070
Hostility	11.3 (4.3)	10.7 (4.5)	t = –1.20, df = 301, p = .230
Activation	11.25 (4.3)	9.2 (4.5)	t = –3.98, df = 301, p < .0001

[a]Baseline BPRS scores were available for 181 white and 122 African American patients.
[b]BPRS factors: positive symptoms = conceptual disorganization, hallucinatory behavior, and unusual thought content; negative symptoms = emotional withdrawal, motor retardation, and blunted affect; anxiety/depressive symptoms = somatic concern, anxiety, guilt feelings, and depressive mood; hostility = hostility, suspiciousness, and uncooperativeness; and activation = tension, mannerisms and posturing, and excitement.
Abbreviation: BPRS = Brief Psychiatric Rating Scale.

(N = 28). Censored data for the discontinuation analysis included those patients still in the hospital and those who were discharged.

RESULTS

Clozapine Prescribing by Race

A total of 10.3% (150/1458) of African Americans with schizophrenia received clozapine treatment compared with 15.3% (223/1453) of whites (χ^2 = 16.74, df = 1, p < .001). For every 3 whites given a clozapine trial, only 2 African Americans were given a trial of clozapine (relative risk = 1.5; 95% CI = 1.2 to 1.8).

Baseline Comparison of African Americans and Whites Receiving Clozapine

The gender and age of whites and African Americans receiving clozapine did not differ nor did the length of hospital stay prior to clozapine initiation (Table 1). Whites had higher total BPRS scores and activation scale subscores than African Americans at the time clozapine was prescribed. There were no significant differences between the groups in positive and negative symptoms, hostility, or anxiety and depression at baseline.

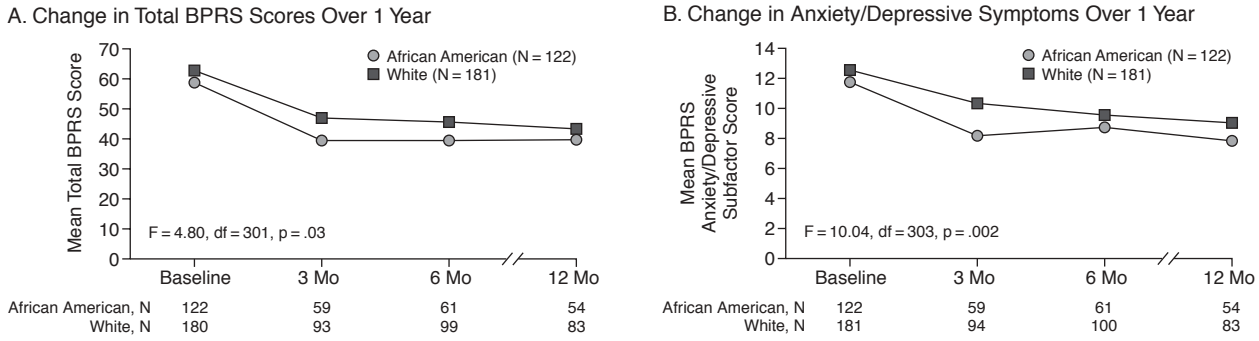
Comparison of African Americans and Whites in Course and Outcomes of Clozapine Treatment

Time to reach stable clozapine dose did not differ between African Americans and whites (Table 1). However, the clozapine dose prescribed to African Americans was significantly lower than the dose prescribed to whites (385.3 ± 200.6 mg/day vs. 447.3 ± 230.3 mg/day; t = –2.66, df = 366, p = .008).

During the 12-month follow-up period, African Americans had significantly greater improvement initially than whites for total BPRS symptoms (time-by-group effects: F = 4.80, df = 301, p = .03) and anxiety/depression (F = 10.04, df = 303, p = .002) after controlling for baseline BPRS scores, clozapine dose, and facility (Figure 1). No significant differences between groups were noted on changes in positive symptoms (F = 2.51, df = 302, p = .114), negative symptoms (F = 0.35, df = 295, p = .556), hostility (F = 2.96, df = 285, p = .086), or activation (F = 1.81, df = 286, p = .179).

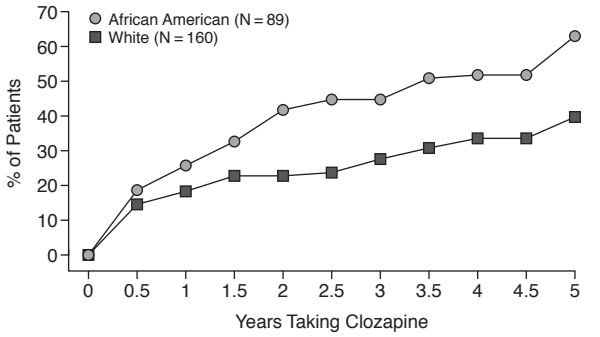
Estimated rates of hospital discharge did not differ between African Americans and whites (log-rank χ^2 = 0.523, df = 1, p = .470). At 1 year, the survival curve estimates for discharge rate were 43% for African Americans and 35% for whites. At 2 years, the rate of discharge was 59% and 53% for African Americans and whites, respectively. On the other hand, African Americans were estimated to be discontinued from clozapine treatment during hospitalization at a significantly higher rate than were whites, once clozapine treatment began (log-rank χ^2 = 4.19, df = 1, p = .041) (Figure 2). The differential rate was most notable after the first 6 months of clozapine treatment. By survival curve estimation, for example, at 1 year 19% of whites and 26% of African Americans are discontinued from clozapine, and, by 2 years following initiation, 23% of whites and 42% of African Americans are estimated to be discontinued from clozapine, representing almost a 2-fold greater probability of clozapine discontinuation among African Americans during inpatient treatment by 2 years after initiation of clozapine. For the survival analysis of time to discharge, 39 (44%) of 89 and 64 (40%) of 159 observations were censored in the

Figure 1. Change in Brief Psychiatric Rating Scale (BPRS) Scores of Inpatients Prescribed Clozapine Over 1 Year by Race[a,b]



[a]Mixed-model repeated measures, controlling for baseline symptoms and dose and facility as a random effect.
[b]The numbers of patients with data are included below for each timepoint. No significant difference in baseline values was noted between those patients included with baseline scores only versus those with baseline and complete follow-up data for both BPRS total symptoms (58.9 ± 15.7 vs. 62.5 ± 14.9 [t = –1.62, df = 291, p = .106]) and anxiety/depression scores (11.0 ± 5.0 vs. 11.7 ± 4.8 [t = –1.04, df = 293, p = .30]).

Figure 2. Estimated Rate of Clozapine Discontinuation During Inpatient Treatment by Race[a]



[a]Log-rank $\chi^2 = 4.19$, df = 1, p = .041.

African American and white groups, respectively. For the survival analysis of time to discontinuation, 59 (66%) of 89 and 123 (77%) of 159 observations were censored, respectively.

DISCUSSION

Consistent with previous studies that have shown differential treatment patterns by race for people with mental illness,[12,13] we observed ethnic disparities in the prescription of clozapine among a large number of inpatients with schizophrenia. Because all subjects were treated in publicly funded inpatient facilities in the state of Maryland, differences in insurance coverage did not likely confound these findings. Furthermore, there were no differences in hospital policy regarding the initiation of clozapine at any of the facilities. The finding of lower prescribing of clozapine in African American populations, particularly in this chronic population, is troubling because of the favorable outcomes associated with clozapine in treatment-resistant schizophrenia. One fifth to one third of all patients with schizophrenia are resistant to standard antipsychotic treatment, and the prevalence does not appear to differ by race.[25–27] Management of treatment-resistant patients has remained a persistent public health problem, and, because treatment-resistant patients are highly symptomatic, they often require extensive periods of hospitalization.[28,29] Although clozapine is more efficacious than other antipsychotic medications in those who are treatment-refractory,[30,31] it remains underutilized, particularly in the African American population, despite its known benefits.[19]

The reasons for disparities in clozapine utilization are not well understood. Clinicians may believe that African Americans are more nonadherent and less likely to follow through with regular monitoring procedures and therefore hesitate to switch patients to clozapine.[9] The concern about weight gain and diabetes may also inhibit the prescription of clozapine to an African American population, who may be at a higher risk for metabolic complications.[32,33] Other explanations include prescriber bias, a higher refusal rate of clozapine treatment by African Americans, and the belief that African Americans may not respond as well as whites to clozapine treatment. Agranulocytosis is a unique side effect of clozapine. There is evidence that African Americans have a lower normal range of leukocytes. However, this lower range is not more likely to increase the risk of agranulocytosis.[22,23] Yet, clinicians may not be comfortable prescribing to a population in which leukocyte counts may be lower than recommended.

Our data showed differences by race in total BPRS symptoms, particularly activating symptoms at baseline, but any clinical significance of this finding is unclear. Previous antipsychotic treatment may contribute to this find-

ing. A few publications report higher levels of symptomatology in African Americans at medication initiation; however, newer reports have not confirmed these findings.[15,34–38] The fact that our study did not find differences in positive, negative, or hostile behaviors suggests that the major symptoms defining treatment-resistant symptoms are similar between the races. Furthermore, the groups did not differ in length of previous hospitalization prior to starting clozapine, suggesting similar severity of illness between the races prior to clozapine treatment.

We found that whites received significantly higher doses of clozapine than did African Americans. Given the sedating properties of clozapine, it is possible that higher doses of clozapine may have been used to target the higher activation levels in whites. This is an interesting finding, as it is generally observed that African Americans receive higher doses of conventional antipsychotics compared to whites.[39] More recent reports, however, have noted higher clozapine dosing in whites compared to Asians.[40] Clozapine is metabolized predominately by the cytochrome P450 1A2 (CYP1A2) isoenzyme system. We are aware of no evidence to suggest that this enzyme pathway differs between African Americans and whites in metabolic activity. However, smoking induces metabolism of clozapine through the CYP1A2 enzyme system that may account for some differences in dosing if smoking differed by race.[41,42] We do not know the smoking status of the patients in this study and hence cannot assess the potential impact of smoking status to these observed differences in dosing. Other factors such as concomitant medications, which may also affect clozapine metabolism, were unknown. A final consideration is gender. Evidence suggests that women have a slower metabolism of clozapine as compared to men.[43] However, the gender breakdown was 29% female in each racial group, and no differences existed between men and women in dosing for either race.

Despite the use of lower doses, African Americans had more robust early improvements in total BPRS scores and in anxiety/depression symptoms than did whites. The response of other symptom clusters was similar in both groups. To date, little research has addressed the question of clozapine efficacy across racial groups.[44] In fact, many clinical trials for clozapine have very few African Americans enrolled or do not report the racial breakdown. For example, Lieberman et al.[45] studied the clinical effects of clozapine and predictors of outcome in a study sample consisting of 10% African Americans. More recently, in a 5-year follow-up study of metabolic complications associated with clozapine, less than 4% of subjects were African American.[46] In fact, despite the efforts of the National Institute of Mental Health to facilitate the study of minorities, a review of 3 major psychiatric journals between 1994 and 1996 revealed that less than 3% of schizophrenia articles reported results using a race analysis, and only 17% even reported the racial composition of the study sample.[47] In our study, we have analyzed symptom response in a large sample of patients with schizophrenia (60% white, 40% African American), thus showing symptom changes in a larger population of African Americans than is generally included in most studies.

Our study found no difference in the potential for hospital discharge by race in this chronically ill population. This point needs further attention and study, as increased clozapine use in general and among African Americans in particular, could reduce hospitalizations and treatment costs. Nonetheless, it must be recognized that factors other than treatment with clozapine may play a more significant role in determining discharge potential, such as severity of symptoms, quality of life, family support, concomitant medical illnesses, and substance abuse status. The finding that an estimated 43% of African Americans who are initiated on clozapine are potentially discharged within 1 year is encouraging since lengths of stay prior to clozapine treatment averaged about 3 years in this chronic inpatient population. Several other groups have found shortened lengths of stay following clozapine initiation; however, none have examined whether discharge varies by race.[48–52] Further work is needed to study the effects of other factors on discharge to discern true differences.

There were significant differences noted in time on clozapine prior to discontinuation during hospitalization. African Americans who were not discharged were significantly more likely to be taken off clozapine compared to whites who were not discharged. However, this difference appears to be greatest among patients who remained on clozapine for at least 6 months, suggesting that if beneficial effects are not observed early in treatment, African Americans may be discontinued sooner than white patients. Since, in general population samples, African Americans do tend to have lower levels of normal white blood cell ranges compared to whites, they may be more likely to reach warning white cell count thresholds, resulting in more discontinuations from clozapine treatment due to this phenomenon.[22,23] More research is needed to clarify whether the same patterns exist among long-term inpatients with schizophrenia.

Among the limitations of this study are the lack of data on concomitant medications, smoking status, and side effects of clozapine as well as the systematic collection of data on reasons for clozapine discontinuation and electronically maintained hematology reports that might explain disparities in clozapine prescribing. However, 1 major advantage to the prescribing data that has not been included in previous reports is the clinical information on symptomatology at baseline and at follow-up during clozapine treatment. This was the main limitation to the study by Kuno and Rothbard[12] and other recent reports of racial disparities in antipsychotic prescription patterns in schizophrenia. It is worthwhile to point out that the ob-

served racial differences in clozapine prescribing may be clinically appropriate; however, our lack of data on the clinical presentation of patients in both racial groups who were not prescribed clozapine precludes drawing firm conclusions. While we do not have the clinical data to evaluate the indications for clozapine use nor the symptom ratings on people not prescribed clozapine, the assumption that African Americans and whites should be prescribed clozapine in the same proportion seems reasonable given that all data suggest that prevalence of treatment-resistant schizophrenia does not differ by race and that insurance differences were not a confounding factor to the prescription of clozapine.

It is evident that racial disparities in treatment, particularly clozapine utilization, continue to exist and that differences in care may not be driven by differences in clinical presentation, symptom response, or discharge readiness. Nonetheless, understanding reasons for this underutilization is urgently needed, as are increased efforts to eliminate racial prescribing differences and to understand reasons for clozapine discontinuation. Future studies should attempt to address some of these unanswered questions and help to improve the quality of care for all people who suffer from schizophrenia.

Drug names: aripiprazole (Abilify), clozapine (Clozaril, FazaClo, and others), olanzapine (Zyprexa), quetiapine (Seroquel), risperidone (Risperdal), ziprasidone (Geodon).

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