Oral Health in Veterans Affairs Patients Diagnosed with Serious Mental Illness

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Abstract

Objectives: *We evaluated patient and medication treatment factors associated with self-reported oral health status in patients diagnosed with serious mental illness (SMI) in a large, national sample of patients in the Veterans Affairs (VA) health system.* ***Methods:*** *4,769 patients (mean age = 55, 7.8 percent women) were included from the VA's 1999 National Psychosis Registry (NPR) for whom the oral health information gathered by the VA's Large Health Survey of Veterans was available. Current (1999) psychotropic medication data were ascertained from the NPR. Multivariable logistic regression analyses were used to determine the patient factors (e.g., sociodemographic, enabling, and treatment factors) associated with poor or fair overall dental health, and with having tooth or mouth problems that made it difficult to eat.* ***Results:*** *While 61.0 percent of persons with SMI self-reported fair to poor dental health, 34.1 percent reported that oral health problems made it difficult for them to eat. Patients who were not employed, experiencing financial strain, who smoked, who were prescribed tricyclic antidepressants, or prescribed selective serotonin reuptake inhibitors were more likely to report poor or fair dental health. These variables were also associated with having tooth or mouth problems.* ***Conclusions:*** *Suboptimal oral health was self-reported with substantial prevalence among patients with SMI, a problematic finding given its consequences for general health, social functioning, and quality of life. Greater efforts are needed to improve oral health outcomes among patients with SMI by facilitating access to dental care and addressing mutable factors such as smoking and medication side effects.*

Key Words: mental disorders, pharmacotherapy, oral health

Introduction

Persons with serious mental illness (SMI), including bipolar disorder and schizophrenia, experience significant functional disability, high rates of general health problems, and premature mortality (1, 2). In addition, advanced dental disease and poor oral health are highly prevalent in patients with schizophrenia (3, 4) and bipolar disorder (5). Poor oral health can be associated not only with serious health problems such as coronary heart disease (6, 7), stroke (6, 7), poorly controlled diabetes (8), and respiratory disease (9) but can also compound the difficulties that persons with SMI have in obtaining employment and potentially social reintegration (4). These persons often lack access to dental care, stemming from few financial resources and a scarcity of dentists who are familiar with the complex clinical needs of persons with SMI (4). Poor oral health is especially pronounced among patients with SMI who have received long-term psychiatric treatment (10–14), especially extended inpatient care (15), a setting that often portends poor access to dentists.

The link between SMI and poor oral health has been attributed to impaired functioning and neglect of self-care, resulting in patients who may not have the means to perform adequate plaque control. In addition, certain psychotropic medications [e.g., chlorpromazine, tricyclic antidepressants (TCAs), and many others] can produce xerostomia and inhibit bone generation (16), which can lead to increased risk of dental caries, gingivitis, and periodontal disease (4, 12). For example, studies suggest that chlorpromazine may be associated with inhibited bone mineral deposits (17, 18), and anticonvulsants can be associated with bone loss (19).

While small clinical studies have documented poor oral health status in patients with chronic schizophrenia (12, 16) and poor periodontal treatment outcomes in patients with clinical depression (20), few have investigated the patient or treatment factors associated with poor oral health in persons with SMI within population-based, routine care set-

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DOI: 10.1111/j.0022-4006.2007.00007.x

tings. Thus, the purpose of this study is to evaluate the patient and medication treatment factors associated with self-reported oral health status in persons diagnosed with SMI within a large, national sample of US veteran patients.

Methods

Study Design and Patient Population. A cross-sectional study was conducted among patients included in the Veterans Affairs' (VA) National Psychosis Registry (NPR) database from fiscal year (FY) 1999 (21) who also completed the VA's Large Health Survey of Veteran Enrollees (LHSV) subsection on health and nutrition behaviors (22). The NPR consists of data for all VA patients with a recorded diagnosis of a SMI at some point from FY 1988 to the present. The NPR was developed and is maintained by the national VA Serious Mental Illness Treatment Research and Evaluation Center (SMITREC), and it includes administrative data on diagnosis, utilization, and pharmacotherapy. The LHSV is one of the largest VA surveys to be conducted on determinants of health and health behaviors among veteran enrollees. The only such survey of its kind to be conducted by the VA, the LHSV consisted of a national random sample of veteran enrollees in 1999 who completed a survey on nutrition, exercise, and demographic variables (22). The reliability and validity of these survey variables have been documented (23).

To create the study population, the 1999 NPR data were merged with data from the LHSV subsection on health and nutrition behaviors. Patients included those from the NPR dataset who were diagnosed with bipolar disorder based on International Classification of Diseases – 9th Revision (ICD–9) codes 296.0-296.1, 296.4-296.8 or schiz-ophrenia (ICD-9 codes 295.0-295.4, 295.6-295.9) in FY 1999, as these represent the most severely ill patients (1). Relatively few of these were diagnosed with other (i.e., nonspecific) psychoses (21). Providers and professional coders assign ICD-9 codes contained in the adminis-trative encounter data that VA facilities routinely collect. Patients whose encounter data recorded both bipolar disorder and schizophrenia were distinguished using the modal diagnosis in FY 1999. The patient was classified as having schizophrenia in cases where there was an equal number of each diagnosis (21), given thatschizophrenia is considered the more disabling of the two (1). Patients with no VA health services utilization (inpatient or outpatient encounters) in both of the prior two fiscal years (FY 1997 to 1998) were excluded. The NPR data-set was merged with the LHSV using social security numbers. No informed consent from patients was necessary, as this was an analysis of secondary data; approval was obtained from local institutional review boards.

Main Outcomes. The LHSV health and nutrition behavior questionnaire included two questions on oral health status. First, patients were asked "How would you describe the health of your teeth and gums?" (overall dental health). Patients' responses included "excellent," "very good," "good," "fair," or "poor." For these analyses patients responding with "poor" or "fair" dental health were compared with those responding with "good," "very good," or "excellent." Second, patients were asked to respond yes or no to the following statement regarding whether they had tooth or mouth problems that made it difficult to eat. These questions were chosen because they represent general perceptions of dental health (24, 25) and were strongly related to objectively measured clinical outcomes based on the clinician report.

Key Covariates. Data on key covariates thought to influence oral health outcomes were derived from the LHSV responses as well as from the NPR database. The Andersen Behavioral Model of Health Services Use (26) was adapted as a framework for determining the patient and treatment factors associated with oral health outcomes in patients with SMI. The Behavioral Model is one of the most widely used models to understand health disparities and inform interventions to improve health and health care for vulnerable groups (26). Specifically, the effect of vulnerable group status on oral health outcomes was assessed, controlling for variables representing factors that enable or impede optimal health outcomes ("enabling factors"), as well as clinical and treatment factors that influence need for care and health outcomes. The Behavioral Model has been previously applied to vulnerable populations (26, 27). "Vulnerable populations" are defined as individuals who have historically faced barriers to appropriate health services when needed, even though enabling factors such as access to care are taken into consideration (26). Based on previous studies on oral health outcomes (27), vulnerable groups in this study included elders, women, racial/ethnic mino-rities (African-Americans, Latinos, Asians/Pacific Islanders, Native Americans), the less educated (e.g., those without a college education), and those with an underlying SMI diagnosis. Data on gender, race, and education were ascertained from LHSV survey responses. Age and SMI diagnosis were ascertained from the NPR. For SMI diagnosis, the reference group was bipolar disorder (1).

Enabling factors may potentially explain the effect of vulnerable group status on oral health (26). Unlike predisposing characteristics, enabling factors are potentially mutable. That is, observed associations between enabling factors and outcomes can inform the development and/or implementation of interventions to improve oral health care for vulnerable populations. Enabling factors that are potentially associated with oral health outcomes include available resources and health behaviors, which are important explanatory variables in determining disparities in oral health. Resources were defined as current employment, whether the patient was currently experiencing financial strain (yes, no), resided in a rural

setting, was VA "service connected," and had access to transportation. Rural setting was defined as whether the patient's residential address from the NPR in 1999 was located in an area with a population of <20,000 and is not adjacent to a metropolitan area based on the Metropolitan Statistical Area information. VA service connection qualifies a veteran for unlimited outpatient care if they experienced a disability acquired primarily during or because of military service. In the VA health care system, dental care is not routinely provided, and the VA does not offer dental insurance; however, all patients have access to emergency oral health care. Lack of access to transportation was defined as whether the patient had no one to take him or her to the doctor. Health behaviors included current smoking based on LHSV self-report and any substance use disorder diagnosis (yes or no, based on the NPR ICD-9 diagnosis data).

Finally, treatment factors were included as covariates, notably medication use. For medications, the use of psychotropics, in particular, medications thought to be associated with risk factors for poor or fair oral health through inhibited salivary production and/or bone loss, were assessed. Patients with at least a 6-month prescription of antipsychotic agents, mood stabilizers (anticonvulsants, lithium), or antidepressant medications [TCAs or selective serotonin reuptake inhibitors (SSRIs)] in FY 1999 were identified. Antipsychotics were categorized as conventional antipsychotics (e.g., haloperidol, perphenazine, chlorpromazine) or atypical antipsychotics available in 1999 (clozapine, risperidone, olanzapine, quetiapine, ziprasidone), given that these two groups differ in spectrum of efficacy and adverse drug effect profile (e.g., safety and tolerability).

Statistical Analyses. Descriptive statistics were generated for each study variable. For the main outcomes (oral health and tooth/mouth problems), descriptive statistics were generated for the SMI cohort as well as for the remaining non-SMI LHSV respondents for comparative purposes. Chi-square tests were used to analyze differences in outcome measures across categorical covariates. Multivariable generalized estimating equation (GEE) models were used to evaluate the probability of self-reported oral health. For both outcome variables, all of the aforementioned predisposing characteristics, enabling factors, and treatment factors were entered into each model. Using GEE, we adjusted for the nested nature of the data where individuals were clustered by facility. All tests were two-tailed, with a criterion alpha level of <0.001 to adjust for multiple comparisons. All analyses were performed using SAS statistical software (SAS Inc., Cary, NC).

For each dependent variable, the probability of suboptimal dental health, namely, the probability of poor or fair overall dental health (compared with excellent, very good, or good dental health) and the probability of poor functional status (i.e., responding "yes" to the question regarding tooth or mouth problems), was modeled. Sensitivity analyses were conducted in which the cutpoint for overall dental health were varied and examined for independent associations of specific drug use (e.g., methamphetamine).

Results

Descriptive Results. Among the sample of 4,769 LHSV respondents, mean age was 55.3 years (standard deviation = 12.6, range: 23 to 93 years), 7.8 percent were female, 69.9 percent were White, and 49.4 percent were diagnosed with schizophrenia (Table 1). On average, patients in this study were similar in age and gender distribution to the general VA patient population (e.g., mean age of the general VA patient population in 1999 was 58 years, and 10 percent were female) (21).

The majority of patients (85.3 percent) were not employed, and about a quarter (24.7 percent) lived in rural settings. Approximately half (49.5 percent) smoked. Over half (57.2 percent) were prescribed antipsychotic medications (Table 1) during the study period; 33.1 percent were on a conventional antipsychotic, and 35.0 percent were on an atypical antipsychotic medication. In addition, 13.9 percent were prescribed TCAs and 53.1 percent were prescribed SSRIs.

Oral Health. Out of 3,981 patients with complete data on overall dental health and patient and medication treatment factors, 61.0 percent (n = 2,428) reported that their dental health overall was poor or fair. Similarly, out of 4,023 with complete data on eating difficulties, patient and medication treatment factors, 34.1 percent (n = 1,371) reported having tooth or mouth problems that made it difficult to eat. Patients with missing oral health data did not differ in demographic characteristics. In contrast, based on data on the non-SMI VA patient population from the same LHSV survey, 42 percent of VA patients without SMI from the same year reported that their dental health was poor or fair, and 27 percent reported tooth or mouth problems.

Multivariable Results. Older age, race/ethnicity, and education were independently associated with poor or fair dental health, after adjusting for predisposing, enabling, and treatment factors (Table 2). In particular, Hispanic/Latinos (adjusted OR = 1.62, $P < 0.001$) compared with Whites and those with less than a college education [adjusted odds ratio (OR) = 1.73, $P < 0.001$] were more likely to report poor or fair dental health. Enabling factors were also associated with poor or fair dental health, notably not being employed (adjusted OR = 1.66, $P < 0.001$), financial strain (adjusted OR = 1.78, $P < 0.001$), and current smoking (adjusted OR = 1.59, $P < 0.001$). These same variables were also associated with tooth or mouth problems (Table 2), with the exception that American Indians compared with Whites (adjusted OR = 1.88, $P < 0.001$) were more likely to report tooth or mouth problems.

Medication use was also independently associated with oral health. Patients currently prescribed

Table 1
Characteristics of Patients Diagnosed with Serious Mental Illness Who Completed the 1999 Large Health Survey of Veteran Enrollees (*n* = 4,769)

	Overall %
Predisposing characteristics	
Age (in years)	
<50	34.7
50 to 64	40.7
≥65	24.6
Gender	
Female	7.8
Male	92.2
Race/Ethnicity	
White	69.9
American Indian	5.4
Black	15.1
Hispanic/Latino	7.4
Asian/Hawaiian/Pacific Islander	2.3
Education	
≤High school	51.4
Some college	35.0
College or more	13.6
Psychiatric diagnosis	
Schizophrenia	49.4
Bipolar Disorder	50.6
Enabling factors	
Resources	
Not employed	85.3
Financial strain	28.5
Rural location	24.7
Service connection	59.7
Nobody to take them to doctor	20.3
Behavioral	
Current smoking	49.0
Any current substance use	36.2
Treatment (medication use)	
Conventional antipsychotic	33.1
Atypical antipsychotic	35.0
Anticonvulsant	40.4
Tricyclic antidepressant	13.9
Lithium	18.5
Selective serotonin reuptake inhibitor	53.1

TCAs were more likely than those not prescribed TCAs to report poor or fair overall dental health (adjusted OR = 1.59, $P < 0.001$), as well as tooth/mouth problems (adjusted OR = 1.46, $P < 0.001$). SSRI use was also associated with poor or fair dental health (adjusted OR = 1.27, $P < 0.001$). Other medications (e.g., antipsychotics) were not associated with poor or fair overall dental health or with tooth/mouth problems (Table 2).

In the sensitivity analyses, using an alternative categorization of the dependent measure of overall dental health (i.e., modeling the probability of "poor," "fair," or "good" dental health versus "very good" or "excellent") produced similar results (data not shown). In addition, specific drug use, notably methamphetamine, had no effect on either measure of oral health status. Only 31 patients (<1 percent) were diagnosed with methamphetamine abuse or dependence based on ICD-9 codes from VA administrative data. While a greater proportion self-reported tooth or mouth problems (43.8 versus 34.7 percent), the difference was not statistically significant ($\chi^2 = 1.15$, $df = 1$, $P = 0.28$). Similarly, there was no difference in overall dental health by methamphetamine use (64.5 versus 61.3 percent, $\chi^2 = 0.16$, $df = 1$, $P = 0.69$). Adding diagnosed methamphetamine use to the multivariable model did not change the results (data not shown).

Summary and Discussion

The majority of patients self-reported that their dental health was poor or fair, and over a third reported tooth or mouth problems of a severity that made it difficult for them to eat. Multiple patient factors including predisposing characteristics (e.g., race/ethnicity, education), enabling factors (e.g., unemployment, financial strain, smoking), and treatment factors (e.g., TCA use) were independently associated with poor or fair oral health status based on the multivariable models. Other medications including conventional or atypical antipsychotics were not associated with oral health status.

Predisposing characteristics, notably older age, racial/ethnic minority, and less education were associated with worse dental health. In addition, Native Americans and Hispanic/Latinos with an SMI diagnosis were more likely to self-report suboptimal oral health. These findings may be attributable to lower perceived need for dental care among these patients, greater perceived barriers to care, and/or potential underlying discriminatory practices toward minorities with SMI (27).

Enabling factors were also consistently associated with poor or fair dental health and tooth/mouth problems, including unemployment, financial strain, and having no one to take the patient to the doctor. These findings are consistent with previous research (28) which suggest that financial hardship often precludes individuals from seeking dental care, as payment for these services is largely out-of-pocket. Smoking was also associated with adverse oral

Table 2
Oral Health Status: Multivariable Logistic Regression Analysis

	Dental health: Poor/Fair (n = 3,981) Adjusted odds ratio (95% confidence interval)	Teeth/Mouth problems (n = 4,023) Adjusted odds ratio (95% confidence interval)
Predisposing characteristics		
Age		
Age 50 to 64 (versus <50)	1.28 (1.09, 1.49)†	1.45 (1.23, 1.70)‡
Age ≥65 (versus <50)	1.17 (0.96, 1.42)*	1.56 (1.26, 1.93)‡
Gender		
Female (versus male)	0.76 (0.61, 0.96)*	0.87 (0.68, 1.12)
Race/Ethnicity		
American Indian (versus White)	1.50 (1.04, 2.16)*	1.88 (1.46, 2.41)‡
Black (versus White)	1.31 (1.06, 1.61)*	1.27 (1.03, 1.55)*
Hispanic/Latino (versus White)	1.62 (1.26, 2.08)‡	1.17 (0.94, 1.47)
Asian/Hawaiian/Pacific Islander (versus White)	1.10 (0.67, 1.81)	1.34 (0.93, 1.93)
Education		
High school (versus college graduate)	1.33 (1.09, 1.61)†	1.28 (1.03, 1.58)*
Some college (versus college graduate)	1.73 (1.43, 2.10)‡	1.43 (1.16, 1.75)‡
Psychiatric diagnosis		
Schizophrenia (versus bipolar disorder)	0.85 (0.73, 0.97)*	1.02 (0.87, 1.21)
Enabling factors		
Resources		
Not employed	1.66 (1.35, 2.03)‡	1.62 (1.28, 2.05)‡
Financial strain	1.78 (1.54, 2.06)‡	2.06 (1.79, 2.37)‡
Rural location (versus urban)	0.93 (0.76, 1.12)	0.83 (0.70, 0.97)*
Service connection	0.90 (0.79, 1.04)	0.85 (0.75, 0.97)*
No one to take patient to doctor	1.43 (1.19, 1.71)‡	1.39 (1.17, 1.66)‡
Behavioral		
Currently smoking	1.59 (1.40, 1.82)‡	1.55 (1.35, 1.79)‡
Current substance use diagnosis	1.12 (0.98, 1.28)	1.08 (0.95, 1.24)
Treatment (medication use)		
Conventional antipsychotic	0.95 (0.81, 1.10)	1.02 (0.88, 1.18)
Atypical antipsychotic	0.89 (0.78, 1.01)	0.96 (0.83, 1.11)
Anticonvulsant	1.03 (0.90, 1.18)	0.98 (0.84, 1.13)
Tricyclic antidepressant	1.59 (1.28, 1.98)‡	1.46 (1.20, 1.78)‡
Lithium	0.88 (0.76, 1.02)	0.85 (0,71, 1.02)
Selective serotonin reuptake inhibitor	1.27 (1.14, 1.43)‡	1.17 (1.03, 1.33)*

* $P < 0.05$.
† $P < 0.01$.
‡ $P < 0.001$.

health outcomes, consistent with prior research (15). Nonetheless, these enabling factors are potentially mutable and represent targets for intervention to improve oral health for persons with SMI.

Treatment factors, namely TCA and SSRI use, were strongly and consistently associated with poor or fair oral health controlling for other covariates. Both TCAs (through anticholinergic effects) and SSRIs are associated with xerostomia (i.e., dry mouth), a known risk factor for dental caries and gum disease. Although antipsychotics can also cause dry mouth, none of the antipsychotic medication groups was significantly associated with poor or fair oral health after adjustment for covariates. However, use of chlorpromazine and other conventional antipsychotics with strong anticholinergic effects was much less frequent in this sample than the use of antidepressants and atypical antipsychotics.

The strengths of this study include a large, national sample of patients with SMI and detailed information on medication use. However, there are limitations to this study that warrant consideration. First, more objective measures of oral health were not available. Information from clinical examinations would have been desirable, but was infeasible to collect on the national scale of this analytic sample. Second, no information was available to confirm substance use disorders such as methamphetamine abuse (e.g., via clinical assessment). The LHSV did not ask patients about the use of specific drugs, and methamphetamine use was not routinely coded using ICD-9 codes in the NPR. Methamphetamine has been associated with xerostomia and subsequent caries (29). Nonetheless, the extent of methamphetamine use may have

been more limited at the time of the LHSV survey (circa 1999). We were also unable to ascertain whether patients were edentulous or had dentures. Nonetheless, lower socioeconomic status may serve as a proxy for denture use. In addition, nonresponse bias may have potentially led to an underestimation of poor oral health outcomes, as homeless or more severely ill VA patients may have been less likely to respond to the LHSV survey. The lack of association between antipsychotic medication use and oral health outcomes might have also been potentially explained by response bias, with sicker patients on higher doses of these medications being less likely to respond to the LHSV. Finally, the study may also have less generalizability outside a veteran population, given the relatively small proportion of women and the fact that the VA is a closed healthcare system. However, it should be noted that individuals with SMI often receive care from providers through public financing mechanisms (e.g., VA, Medicaid), and thus this study population may have similar oral health issues compared with persons with SMI in the general population of the United States.

Overall, our findings highlight the need to improve the oral health of patients with SMI and have important clinical and policy implications in improving the oral health of vulnerable populations. First, greater efforts are needed to improve oral health outcomes among VA patients with SMI by addressing the enabling factors we observed in our study that were associated with oral health. In particular, the VA and other health services organizations that care for patients with SMI should consider expanding health benefits to cover routine dental care, especially for lower income individuals. Access to dental care at the patient's primary point of contact (e.g., mental health facility) should also be improved. At the mental health provider level, existing care should include prevention and monitoring services that can improve oral health. For example, nutrition and smoking cessation programs should be enhanced within mental health care settings. Mental health providers should also monitor patients taking antidepressants (SSRIs, TCAs) for symptoms suggestive of adverse effects on oral health. Finally, dentists should be trained to address the oral health issues of patients diagnosed with SMI through greater familiarity with the multiple factors associated with poor or fair dental outcomes in this vulnerable population. An improved knowledge base can assist dentists in more effectively serving these patients, and in turn enhance patients' overall health status and help them gain self-esteem through improved oral health (4). Ultimately, given the potential impact of oral health on appearance and vocational advancement, dental care should be considered an important component of recovery-oriented services for persons with SMI.

Sources of Support

This research was supported by the Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development Service (IIR 02-283-2; A. Kilbourne, PI). This work was also completed with the support of the Center for Health Equity Research and Promotion VA, Pittsburgh Healthcare System (M. Fine, PI), and the VA National Serious Mental Illness Treatment Research and Evaluation Center (F. Blow, Dir.). Drs. Kilbourne and McCarthy are funded by the Career Development Award Merit Review Entry Program from the VA Health Services Research and Development program. Dr. Post is funded by a Career Development Award from the National Institute of Mental Health (K23 MH001879).

Acknowledgments

We would like to acknowledge the VA Office of Quality and Performance for providing access to the LHSV data, and John R. Elter, DMD, PhD of the VHA Office of Quality and Performance Data Center for comments on an earlier draft of this manuscript.

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