

Survey of Non-Dental Providers' Assessment and Management  
of Xerostomia in Patients with Mental Health Disorders

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**Abstract**

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**Introduction:** Approximately 26% American adults suffer from a diagnosable mental disorder, and 6% of the population suffers from a severe mental illness. Individuals with mental health disorders often have poor oral health, which may be exacerbated by rich diets, heavy tobacco use, and difficulty in accessing care. In addition, medications used to treat mental health disorders have side effects that can be detrimental to the tissues of the oral cavity. Xerostomia (dry mouth) is reported to affect one-fifth of patients taking antidepressants, with presence and severity of xerostomia positively correlated with the number of medications taken. It is unclear if possible xerogenic side effects are discussed with patients by healthcare providers prior to beginning treatment in the medical care setting. The purpose of this study is to survey prescribing healthcare providers to determine what non-dental providers know about xerostomia and to examine what information about potential side effects, if any, these practitioners provide patients before beginning pharmacological treatment for mental illnesses.

**Methods:** Representative samples of health care providers in King County, Washington (125 primary care physicians, 50 nurse practitioners, and 75 psychiatrists) were mailed a 31-question survey. Participants were asked about their prescribing practices, knowledge about oral health side effects of medications, consideration of oral health side effects when prescribing psychotropic medications, and frequency of assessing patients' oral health. Responses were summarized in each area with regard to oral health knowledge and willingness to assess patients' oral health.

**Results:** The response rate to this survey was 40%: 101 total responses, with 45 primary care physicians, 20 nurse practitioners, and 36 psychiatrists responding. The average age of responders was 56.7 years, with an average of 24.6 years within their profession. The majority of providers (90%) reported they evaluated oral health by "appearance of teeth," but what specifically is evaluated is unclear because far fewer providers reported assessing missing teeth, presence of

plaque or calculus, looseness of teeth, or saliva consistency. Providers were less likely to assess the oral health of their patients being treated for a mental illness than those without. In addition, while 91.6% of providers reported that they have at least some patients who report xerostomia, knowledge of recommended treatments for dry mouth symptoms appears to be lacking.

**Discussion:** This survey illustrates the complexities of treating patients and managing adverse medication side effects. While this survey identifies gaps in oral health treatment in the non-dental setting for patients with mental health conditions, future studies are needed about the specific barriers to providing adequate oral health recommendations to patients with mental illness, for this vulnerable population is in great need for holistic medical care, including dental care. Ultimately, improved provider management of oral needs would allow for not only an improvement of oral health (e.g. reduction in caries, periodontal disease) but also larger issues, such as improved quality of life and improved management of comorbid chronic conditions.

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## Introduction

It is estimated that 26.2% of American adults suffer from a diagnosable mental disorder, and that 6% of the population suffers from a severe mental illness at one or more times in their lifetime (National Institute of Mental Health (NIMH), 2009). Nearly half of all individuals with mental illness will present with two or more mental disorders. Mental health disorders in the United States are the leading cause of disability (John, 1996; NIMH, 2009). The cost of treating mental illness is great; in 1996, treatment for patients with mental health disorders accounted for 7.3% of the total U.S. health budget (NIMH, 2009).

Mental health disorders include mood disorders, such as Major Depressive Disorder and Bipolar Disorder; anxiety disorders such as Obsessive-Compulsive Disorder (OCD) and Panic Disorder, and psychotic disorders such as Schizophrenia. The disorders vary in prevalence: about 1% of the American population has or will develop schizophrenia (Friedlander and Liberman, 1991), while 20% of women and 10% of men will experience a depressive episode in his or her life (D'Mello, 2003). Treatment of mental health disorders varies with the diagnosis. The most common treatments include pharmacotherapy, cognitive-behavioral therapy, other types of psychotherapy, or a combination of these (Clark, 2003; Friedlander and Mahler, 2001; Freidlander and Norman, 2002). It has become increasingly common for patients with major depressive disorders to be treated with medications only (Olfson and Marcus, 2009).

Antidepressants are used to treat not only mild to severe depression, but also late-life depression and some anxiety disorders such as obsessive-compulsive disorder, certain phobias, and agoraphobia (Friedlander and Norman, 2002; King, 1998). Antidepressants are arranged into four major groups: tricyclics (TCA's; e.g., Tofranil, Elavil), selective serotonin reuptake inhibitors (SSRI's; e.g., Prozac, Paxil), monoamine oxidase inhibitors (MAOI's; e.g., Nardil, Parnate), and atypical antidepressants (e.g. Wellbutrin, Effexor) (Friedlander and Mahler, 2001). Antipsychotics, or

neuroleptics, (e.g. Haldol) are often prescribed to calm patients with schizophrenia and mood disorders, and also to help diminish symptoms like hallucinations, delusions, and agitation. Atypical antipsychotics (e.g., Clozapine) may also be used to treat schizophrenia, without causing undesired movement symptoms (Friedman and Liberman, 1991). Antimanic, or mood-stabilizing, medications (e.g., Lithium) are most commonly used to treat bipolar disorder, but their use is often limited by their toxicity. Anticonvulsants, some antipsychotics, and some antidepressants have had success as alternative treatments for bipolar disorder (Clark, 2003). Anxiolytics (e.g., Ativan, Valium, Xanax) are used for their sedative properties in treating various anxiety disorders and sleep disturbances (King, 1998).

Individuals with mental health disorders often have poorer oral health, which is compounded by many issues. Oral hygiene is often poor in these individuals, as it is often viewed as a low priority, and also because they tend to consume high carbohydrate diets, and some have cognitive impairment from medications like Lithium (Friedlander, 2001; Stiefel et al., 1990). Increased appetite and vomiting (as seen in over 20% of persons with mental health disorders), related to medication use, can also have a negative impact on dental health (Stiefel et al., 1990). Patients with psychiatric illness are also more likely to be heavy smokers, which can have severe impact on periodontal health and cause heavy staining on the dentition (King, 1998; D’Mello, 2003). Those with major depression also report higher denture dissatisfaction (John, 2006).

Many individuals with mental health disorders have trouble accessing all necessary health treatments, including dentistry (King, 1998). Treating patients with mental health conditions in the dental office can be difficult due to behavioral and motivational factors, which may impact the quality of dental care provided. These patients often have high dental needs, due not only to poor oral hygiene, but also to dental avoidance, and dental fears (Persson et al., 2009). Many patients avoid visiting the dentist because of financial limitations and difficulties in getting rides to the office

(Kilbourne et al., 2007). When they do visit the dentist, some patients may not even admit to mental health disorders because of the stigma attached (Friedlander and Mahler, 2001). Communication and compliance with oral hygiene can also vary between appointments (King, 1998). Cautious treatment planning is necessary to manage the patient's psychiatric and other co-morbid medical conditions, while simultaneously considering the patient's ability to maintain their oral hygiene and their financial capabilities. Oftentimes treatment of these patients will involve direct communication with caregivers (King, 1998).

Unfortunately, didactic or clinical work with this population is not explicitly required by the Commission on Dental Accreditation, which regulates all dental schools in the United States (ADA, 2010). The extent that dental students in the US receive education about treatment and management of patients with mental health problems is not widely discussed in the literature. Krause and colleagues (2010) examined the amount of training that U.S. dental students receive regarding adults with special health care needs, including varying developmental and acquired disabilities. They found that while 91% of students received training in patients with "mental impairments," the frequency of exposure within the academic setting was widely varied, and very few had actual clinical experience (Krause et al., 2010).

Medications prescribed for mental illness can also have detrimental effects on the oral cavity. Atypical antidepressants and SSRIs, for example, can cause xerostomia (dry mouth), dysgeusia (taste changes), stomatitis (inflammation of mucous membranes in the mouth), and glossitis (inflammation of the tongue) (Friedlander and Mahler, 2001). Xerostomia is a common side effect of the majority of the drugs used to treat mental health disorders, due to their antimuscarinic properties (Visvanathan and Nix, 2009). Symptoms of xerostomia include rampant tooth decay, dysphagia (difficulty swallowing), increased incidence of Candidiasis (fungal infection, i.e. thrush), angular chelitis (inflammation and cracking at the corners of the mouth), challenged mastication

(chewing and swallowing) and speech due to sensation of dry mouth, and challenges with denture retention (Clark, 2003; Visvanathan and Nix, 2009). Of patients taking atypical antidepressants and SSRIs, approximately 18% will experience xerostomia. Presence and severity of xerostomia is also positively correlated with the number of medications taken (Stiefel et al., 1990). Xerostomia is also associated with decreased oral hygiene (Persson et al., 2009). Xerostomia was found to be one of the most distressing side effects from psychotropic medications (Covell et al., 2007). Compromised oral health from xerostomia may have long-term consequence on the patient, as quality of life can be diminished by poor appearance, bad odor, and negative impacts on self-esteem (Sjögren and Nordstrom, 2000; Kilbourne et al., 2007).

In advising patients about taking psychotropic medications, it is vital for prescribing providers to discuss measures to prevent negative oral health consequences secondary to xerostomia. These measures can include a change in the type or dosage of medications, more frequent dental visits (e.g., three month recall appointments), increased intake of fluids, saliva-activating medications (e.g., Salagen), ascorbic and malic acids (although they can have a negative effect on the enamel), saliva-replacements, frequent tooth brushing, mouth rinses, topical fluoride, and consumption of xylitol-containing products (Chalmers, 2008; Visvanathan and Nix, 2009). Very little is known about what non-dental providers tell their patients about xerostomia, or whether it is even addressed when these medications are prescribed. In one study of 113 psychiatric patients, 69% experienced some signs of dry mouth, yet none were prescribed saliva-activating medications or any other preventative methods (Persson et al., 2009). This project aims to understand what providers are telling their patients about the potential for xerostomia with the medications they prescribe, and what information providers share with patients about prevention of negative oral health consequences.

## **Rationale and Research Design**

This study has three primary objectives: 1. To determine what non-dental providers know about xerostomia (dry mouth), a common side effect from psychotropic medications, 2. To examine what discussion regarding potential side effects, if any, these practitioners provide patients before beginning treatment with psychotropic medications and what signs of oral health they assessed and discuss with patients, and 3. To provide feedback to the providers about what information to provide their patients, recommended measures to counteract the side effects, and simple methods they can use to determine the oral health status of their patients. The first and second objectives were completed by sending out questionnaires to a sample of mental health and primary care providers (primary care physicians, nurse practitioners, and psychiatrists) in King County in Washington State. The third objective was met by providing participating practitioners with a patient pamphlet and oral hygiene checklist. We hypothesized that xerostomia is not well recognized as a potential negative side effect of psychotropic medications for prescribing non-dental practitioners, and that very little, if anything, about oral health impacts is discussed with patients prior to beginning pharmaceutical treatment.

## **Research Methods:**

Participants: Providers were recruited from one of three professional groups in King County, Washington, who prescribed psychotropic medications: general practitioners, nurse practitioners, and psychiatrists. Physician names were identified through an online search, using the terms “Psychiatrist,” “General Practitioners,” and “Family Medicine,” to search the King County Medical Society Web site ([kcmsociety.org](http://kcmsociety.org)). For general practitioners, providers who primarily treat children or adolescents, or had practiced in the following specialties were not invited to participate: ophthalmology, orolaryngology, internal medicine, forensic medicine, sports medicine, tropical medicine, anesthesiology, pathology, dermatology, plastic surgery, oncology, obstetrics, osteopathic medicine, neurology, hyperbaric treatment, immunology, administrative medicine, endocrinology, rheumatology, infectious disease, urology, and emergency medicine. Names of nurses were found by searching the site [nurse.net](http://nurse.net) using the term “Nurse Practitioners” with a search for each city within King County. The DexOnline telephone listings for King County, WA, under the headings listed above, was also used to identify additional providers. For psychiatrists, providers who primarily treated children or adolescents, or had practiced in the forensics, were not invited to participate.

Participants were eligible to participate if they were in active practice (within the last six months) and prescribed psychotropic medications (e.g., antidepressants, anxiolytics, antipsychotic medications) to their patients. Attempts were made to recruit proportional numbers of providers in each of the three groups to better represent the King County provider population. After all potential providers were identified (609 total providers – 361 general practitioners, 109 nurse practitioners, and 138 psychiatrists), 250 providers were randomly selected within Microsoft Excel to be contacted by mail - 125 general practitioners, 50 nurse practitioners, and 75 psychiatrists. If a survey was returned for one of the reasons listed below, a mailing was sent to the next provider on the randomized list for each category. Reasons for a new mailing included: surveys returned because

provider no longer at that address, providers chose not to participate, or providers identified themselves as no longer in active practice or that their location was no longer considered to be within King County.

Protocol: Providers were contacted by mail, between March 2011 and June 2011, in a modified form of the Dillman Total Design Method (Hoddinott & Bass, 1986). Enclosed in the first mailing were an introductory letter (Appendix A), a 31-question survey (Appendix B), a \$2 bill, and a postage-paid return envelope. The study protocol and all written materials were approved by the University of Washington Institutional Review Board (IRB). After four weeks, non-responders were sent a new mailing, including a different introductory letter (Appendix C), the 31-question survey, and postage-paid return envelope. Responders were mailed a thank you letter (Appendix D), a pamphlet designed for their patients with advice for responding to their dry mouth (Appendix E) both in color and in black and white, and an oral health checklist for non-dental providers to assess their patients' oral health (Appendix F).

Measures: The 31-question survey (Appendix B) was written to assess six major topics. All questions were reviewed and discussed among all members of the study team. The mental health of patients and prescribing habits were addressed in questions 1-4; question 5 addressed side effects; providers' knowledge of dry mouth, consequences, and ways to counteract these consequences was assessed in questions 6-9; providers were asked how often they assess their patients' oral health, and by what criteria in questions 10-13; patient characteristics were measured in questions 14-21, and provider characteristics in questions 22-31. Providers were invited to write in anything that they felt may have been overlooked in the survey, or additional information they wanted to provide, on the final page of the survey.

Data Analysis: Questionnaire data were double-entered by hand into an Excel database and checked for errors. Practice characteristics were computed, and differences in knowledge of dry

mouth were examined in light of these. Specifically, analyses of variance (ANOVA's) were conducted to examine differences in knowledge across the three practitioner groups for continuous variables. Frequency analyses were examined to identify which group(s) were more likely to prescribe psychotropic medications and what side effects they consider most, and which group(s) may be targeted for further oral health intervention programs. Categorical variables were analyzed using the  $\chi^2$  test.

**Results:**

A total of 97 providers replied to this mailed survey. Of these, 44 were general practitioners, 19 were nurse practitioners, and 34 were psychiatrists. The percentage response by provider type is shown in Table 1. Although there was a slightly higher response rate for psychiatrists (48%, compared to 40% of nurse practitioners and 36% of general practitioners), this difference was not statistically significant. Provider characteristics are listed in Table 2. There were significant differences, however, in age and gender of provider groups. Nurse practitioners were 89% female, compared to 31% of psychiatrists and 52% of general practitioners. Further, psychiatrists averaged the oldest, at 61.2 years (s.d.=9.4), compared to 55.1 (8.6) years for general practitioners and 53.7 (8.4) years for nurse practitioners. Race and ethnicity were far more homogenous, with the majority of responders identifying as non-Hispanic or Latino (90.6%) and white (91.7%). The differences across the provider groups for race and ethnicity, displayed in Tables 4 and 5, were not significant.

**Mental health of patients and prescribing habits: Questions 1-4**

There were some significant differences ( $p < 0.05$ ) in patient characteristics and management of patients, as displayed in Table 3. General practitioners were much more likely to report that their patients received their primary care from them (85.1% versus 42.3% from nurse practitioners and 1.5% from psychiatrists). Psychiatrists spent more minutes with each patient (36.5 minutes compared to 29.5 minutes with nurse practitioners and 19.7 minutes with general practitioners). Further, while nurse practitioners were significantly more likely to see non-white patients, there was no significant difference amongst the provider groups for accepting Medicaid recipients.

Table 1: Response to mailed survey, by provider type.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists
Total number invited to participate	250	125	50	75
Number of respondents	101	45	20	36
Percentage of response	41.1%	36.0%	40.0%	48.0%

[p=0.246] p-value from chi<sup>2</sup> test.

Table 2: Provider Characteristics

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
Number of hours per week practitioner usually works?	39.4	41.6	38.9	37.1	0.375
Number of years practitioner has been in your current profession	24.6	25.2	18.3	27.6	0.056
Number of years practitioner has been practicing in King County?	22.3	22.1	17.5	25.4	0.089
Number of years practitioner has been in your current office location?	12.6	13.5	10.9	12.5	0.875
Percent Male	45%	49%	10%	62%	0.007
Percent Female	55%	51%	90%	38%	0.007
Age	56.9	55.1	53.7	61.2	0.007

Two-sided p-value from ANOVA test for analysis of variance.

Table 3: Patient Characteristics

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
Number of minutes practitioner, on average, do you spend with a patient?*	27.9	19.9	29.8	36.7	<0.001
Percentage of female patients	60%	58.6%	63%	60%	0.610
Percentage of non-white patients	22%	24%	34%	14%	0.002
Percentage of patients 65 years of age or older	18%	22%	19%	14%	0.229
Percentage of patients who wear dentures (Partial or Complete)?	9%	10%	8%	7%	0.543
Percentage of patients from middle or upper class households?	56%	56%	46%	63%	0.113
Percentage of your patients who are Medicare recipients	19%	21%	20%	15%	0.545
Percentage of patients who take 3 or more different medications a day	45%	41%	57%	44%	0.130
Percentage of patients that practitioners serves as their primary care provider	46.5%	83.1%	42.2%	1.5%	<0.001

\* p-value from ANOVA test for analysis of variance  
 Remaining p-values from chi<sup>2</sup> test.

Table 4: Ethnicity of participants, by provider group

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists
N=	97	43	19	35
Hispanic or Latino	6.1%	9.3%	0%	5.7%
Not Hispanic or Latino	93.9%	90.7%	100%	94.3%

[p=0.740] p-value from chi<sup>2</sup> test

Table 5: Race/ethnicity of participants, by provider group.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists
N=	97	43	19	35
American Indian / Alaska Native	1.0%	2.3%	0.0%	0.0%
Asian	3.1%	7.0%	0.0%	0.0%
Native Hawaiian or other Pacific Islander	0%	0.0%	0.0%	0.0%
Black or African American	1.0%	0.0%	0.0%	2.9%
White	91.7%	88.4%	100	91.2
More than one race	2.1%	2.3%	0.0%	2.9%
Other	1.0%	0.0%	0.0%	2.9%

[p=0.540] p-value from chi<sup>2</sup> test

Overall, providers reported that about 46% of their patients were prescribed psychotropic medications. General practitioners were the least likely to prescribe psychotropic medications, prescribing them to 24.2% of patients, while psychiatrists treated 75.8% of their patients with psychotropic medications. (Nurse practitioners were in the middle, prescribing to 40.7% of patients). Differences amongst the three groups in prescribing psychotropic medications were statistically significant ( $p < 0.001$ , ANOVA). A list of conditions treated by all provider groups is provided in Table 6. Anxiety/panic disorders, depression, and mood disorders were the most commonly treated conditions for all provider groups. Frequency of treating anxiety/panic disorders, bipolar, depression, mood disorders, personality disorders, and schizophrenia differed significantly across the groups, with these conditions most often treated by psychiatrists.

Table 6: Mental health conditions regularly treated in adult (21+ years of age) patients

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
Anxiety/panic disorders	95%	98%	80%	100%	0.003
ADD/ADHD	76%	82%	56%	81%	0.223
Bipolar disorder	80%	72%	74%	94%	0.036
Depression	95%	98%	80%	100%	0.003
Mood disorders	94%	98%	72%	100%	<0.001
OCD	76%	74%	56%	90%	0.146
Personality disorders	62%	51%	38%	90%	0.002
Postpartum depression	61%	63%	41%	70%	0.375
Schizophrenia	45%	32%	35%	68%	0.006
AVERAGE	76%	74%	59%	88%	

p-values from chi<sup>2</sup> test

Tables 7 and 8 list the frequencies that providers prescribe specific medication classes for mental health problems. The most commonly prescribed medication class for all provider groups was SSRIs. Table 8 lists the percentage, by each provider type, of those who prescribed each medication more than twice a month. There were significant differences in prescribing habits across the groups for: antipsychotics/neuroleptics (p = 0.039), atypical antidepressants (p =<0.001), atypical antipsychotics (p =<0.001), SSRIs (p= 0.004), and tricyclics (p=0.040).

Table 7: How often medications in specific pharmaceutical classes are prescribed, by provider type.

	total			General Practitioners			Nurse Practitioners			Psychiatrists		
	never	<2x/ month	2+/ month	never	<2x/ month	2+/ month	never	<2x/ month	2+/ month	never	<2x/ month	2+/ month
antipsychotics/ neuroleptics	24%	35%	35%	30%	41%	20%	26%	21%	42%	16%	34%	50%
atypical antidepressants	12%	36%	48%	18%	45%	32%	16%	37%	42%	0%	22%	75%
atypical antipsychotics	21%	29%	43%	32%	34%	25%	26%	32%	37%	3%	22%	72%
anticonvulsants	8%	38%	49%	5%	52%	36%	16%	32%	53%	9%	22%	66%
benzodiazepines	4%	27%	64%	6%	32%	57%	5%	37%	53%	3%	16%	81%
psychostimulants	16%	32%	46%	9%	41%	41%	32%	26%	32%	16%	22%	63%
MAOIs	69%	19%	3%	75%	14%	0%	79%	11%	5%	56%	31%	6%
SSRIs	5%	7%	83%	2%	0%	89%	21%	16%	63%	0%	13%	88%
tricyclics	13%	46%	38%	5%	39%	52%	32%	47%	21%	13%	56%	28%

Table 8: Percentage of providers who prescribed medications more than twice a month, by provider type.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
Antipsychotics/neuroleptics	34%	20%	40%	50%	0.039
Atypical antidepressants	47%	31%	40%	74%	<0.001
Atypical antipsychotics	42%	24%	35%	71%	<0.001
Anticonvulsants	48%	36%	50%	65%	0.061
Benzodiazepines	65%	58%	55%	79%	0.166
Psychostimulants	44%	40%	30%	59%	0.193
MAOIs	3%	0%	5%	6%	0.300
SSRIs	83%	87%	65%	88%	0.004
Tricyclics	38%	51%	25%	29%	0.040

p-value from  $\chi^2$  test

Providers were also asked about specific medications that they prescribed at least twice a month. Significant differences were seen in prescriptions of: Aripiprazole (Abilify), Gabapentin (Neurontin), Haloperidol (Haldol), Lithium, Lorazepam (Ativan), and Topiramate (Topamax). These were more often prescribed by psychiatrists, except for Gabapentin and Topiramate, which were more often prescribed by general practitioners and nurse practitioners.

Table 9: Percentage of providers who prescribed each specific medication at least twice a month

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
Alprazolam (Xanax)	62.8%	68.4%	50.0%	63.3%	0.436
Amphetamine (Adderall)	55.3%	57.9%	41.2%	60.0%	0.743
Aripiprazole (Abilify)	43.0%	23.7%	41.2%	67.7%	0.001
Bupropion (Wellbutrin)	84.6%	87.8%	77.8%	84.4%	0.637
Clozapine (Clozaril)	8.3%	5.4%	5.9%	13.3%	0.277
Diazepam (Valium)	31.8%	34.2%	15.8%	38.7%	0.473
Duloxetine (Cymbalta)	55.2%	51.3%	47.1%	64.5%	0.566
Carbamazepine (Tegretol)	35.6%	36.6%	27.8%	38.7%	0.953
Fluoxetine (Prozac)	76.7%	87.5%	61.1%	71.9%	0.116
Gabapentin (Neurontin)	68.1%	85.4%	63.2%	48.4%	0.006
Haloperidol (Haldol)	16.5%	8.1%	11.8%	29.0%	0.014
Imipramine (Tofranil)	10.6%	13.5%	0.0%	12.9%	0.767
Lithium	48.2%	32.4%	17.6%	83.9%	<0.001
Lorazepam (Ativan)	65.2%	60.5%	47.4%	81.3%	0.027
Paroxetine (Paxil)	71.1%	75.6%	64.7%	68.8%	0.736
Isocarboxazid (Marplan)	1.2%	0.0%	5.9%	0.0%	0.132
Methylphenidate (Ritalin)	44.8%	43.6%	17.6%	61.3%	0.051
Nortryptiline	42.5%	47.4%	44.4%	35.5%	0.481
Phenelzine (Nardil)	3.6%	2.7%	5.9%	3.3%	0.844
Risperidal (Risperidone)	38.4%	23.7%	29.4%	61.3%	0.005
Sertraline (Zoloft)	81.5%	90.5%	72.2%	75.0%	0.147
Topiramate (Topamax)	44.2%	47.4%	61.1%	30.0%	0.036
Valproic acid (Depakene)	40.7%	28.9%	41.2%	54.8%	0.074
Venlafaxine (Effexor)	76.7%	76.9%	78.9%	75.0%	0.964

p-values from chi<sup>2</sup> test

Concerning side effects: Question 5

Providers were questioned regarding what side effects they considered most when prescribing psychotropic medications. Table 10 shows the percentage of time that the symptom was ranked within the top five. Anxiety, sexual dysfunction, sleep disturbances, and weight changes were most often listed in the top five for all provider types.

Table 10: This table depicts the percentage of providers, of each professional type, who ranked the following side effect as one of their top five most considered side effects.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
Anxiety	57.0%	62.2%	55.0%	51.4%	0.614
Aggressive behavior	11.0%	8.9%	10.0%	14.3%	0.737
Dizziness	34.0%	42.2%	25.0%	28.6%	0.281
Fainting	10.0%	4.4%	10.0%	17.1%	0.171
GI disruptions	38.0%	33.3%	35.0%	45.7%	0.502
High blood pressure	26.0%	22.2%	35.0%	25.7%	0.555
Memory impact	18.0%	15.6%	10.0%	25.7%	0.292
Renal failure	13.0%	8.9%	15.0%	17.1%	0.529
Seizures	15.0%	11.1%	10.0%	22.9%	0.270
Sexual dysfunction	68.0%	62.2%	65.0%	77.1%	0.347
Skin irritation	12.0%	8.9%	10.0%	17.1%	0.505
Sleep disturbances	62.0%	51.1%	60.0%	77.1%	0.058
Tremors	18.0%	17.8%	15.0%	20.0%	0.897
Trouble breathing	8.0%	4.4%	10.0%	11.4%	0.487
Vision changes	7.0%	4.4%	5.0%	11.4%	0.443
WBC dysfunction	14.0%	13.3%	10.0%	17.1%	0.752
Weight changes	66.0%	57.8%	60.0%	80.0%	0.094
Xerostomia	32.0%	28.9%	20.0%	42.9%	0.181

p-values from chi<sup>2</sup> test

*Providers' knowledge of dry mouth, consequences, and ways to counteract them*

Table 11 presents providers' knowledge about the common consequences of dry mouth. Of interest, more than half the providers answered that burning mouth syndrome and increased prevalence of candidiasis were not consequences of dry mouth, when in fact, they are. All symptoms listed in the table are consequences of xerostomia, except for the highlighted answers – pulpal pain and staining of teeth. While these were the least often marked as “yes,” these were also the choices marked most frequently as “not sure.”

Table 11: Number of providers who answered “yes,” “no,” or “unsure” of the following conditions being associated with xerostomia. All symptoms listed in the table are consequences of xerostomia, except for the highlighted answers – pulpal pain and staining of teeth.

	total			GP			NP			PSY		
	never	<2x/ month	2+/ month	never	<2x/ month	2+/ month	never	<2x/ month	2+/ month	never	<2x/ month	2+/ month
patient annoyance	10	9	74	7	3	32	3	4	12	0	2	30
halitosis/bad breath	13	4	76	4	2	36	2	2	14	7	0	26
burning mouth syndrome	48	9	34	16	5	21	11	3	3	21	1	10
hoarseness	26	16	49	8	7	27	8	5	4	10	4	18
caries (tooth decay)	12	4	78	5	1	36	5	2	12	2	1	30
periodontal disease	12	5	76	5	2	35	5	2	11	2	1	30
taste disruption	12	6	76	3	4	35	3	1	15	6	1	26
cotton mouth	7	5	82	4	2	36	3	2	14	0	1	32
<i>pulpal (tooth nerve) pain</i>	46	27	17	20	14	8	10	4	2	16	9	7
sores in mouth	28	9	55	13	3	26	7	2	8	8	4	21
difficulties with dentures	28	5	49	11	1	20	8	2	8	9	2	21
cracked lips	14	4	74	3	2	37	3	2	13	8	0	24
<i>staining of teeth</i>	58	15	18	27	7	8	13	1	3	18	7	7
saliva changes	9	4	78	4	1	37	3	2	13	2	1	28
increased prevalence of thrush/candidiasis	42	10	40	17	3	22	9	3	5	16	4	13

Table 12 displays the percentage of providers who answered in the affirmative for each side effect, with significant differences reported across the provider groups. Significant differences were found across the groups for patient annoyance, burning mouth syndrome, hoarseness, and cotton mouth. In these cases, it was the nurse practitioners who answered “yes” least often.

Table 12: Number of providers who answered in the affirmative that the following side effects were associated with xerostomia, and the corresponding p-value for differences across the groups.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
Patient annoyance	79.4%	76.7%	60.0%	94.1%	0.010
Halitosis/bad breath	81.4%	86.0%	78.9%	77.1%	0.574
Burning mouth syndrome	35.8%	48.8%	16.7%	29.4%	0.036
Hoarseness	54.7%	65.1%	27.8%	55.9%	0.028
Caries (tooth decay)	82.7%	86.0%	65.0%	88.6%	0.063
Periodontal disease	81.4%	83.7%	63.2%	88.6%	0.063
Taste disruption	80.4%	81.4%	80.0%	79.4%	0.975
Cotton mouth	87.8%	86.0%	75.0%	97.1%	0.049
<i>Pulpal (tooth nerve) pain</i>	19.1%	20.9%	11.8%	20.6%	0.693
Sores in mouth	60.8%	62.8%	52.6%	62.9%	0.717
Difficulties with dentures	64.6%	72.1%	47.4%	64.7%	0.172
Cracked lips	79.2%	88.4%	73.7%	70.6%	0.131
<i>Staining of teeth</i>	21.1%	20.9%	22.2%	20.6%	0.990
Saliva changes	85.3%	88.4%	73.7%	87.9%	0.281
Increased prevalence of thrush/candidiasis	44.8%	53.5%	33.3%	40.0%	0.273

p-values from chi<sup>2</sup> test

When asked how often providers discuss the side effects of dry mouth prior to prescribing xerostomic medications, slightly more than half of the providers “often” or “always” did, with the distributions shown in Table 13. The difference across these groups was not significant.

Table 13: Frequency that providers discuss the side effects of dry mouth with their patients before prescribing a medication that may cause dry mouth.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists
Rarely	9.6%	7.0%	16.7%	9.1%
Sometimes	37.2%	44.2%	38.9%	27.3%
Often	31.9%	34.9%	22.2%	33.3%
Always	21.3%	14.0%	22.2%	30.3%

[p = 0.367] p-value from chi<sup>2</sup> test

Providers were then asked what percentage of their patients report having dry mouth (see Table 14). When the data are analyzed by the six percentage categories, the difference is almost significant (p=0.052). But when the percentage of providers who answered 10% or less is compared to those who answered 10% or more, this difference is significant (p=0.019). Overall, 80.6% of providers felt 10% or less of their patients experience dry mouth; amongst the provider types, this was 93.1% of general practitioners, 75.0% of nurse practitioners, and 68.6% of psychiatrists.

Table 14: Estimated percentage of patients that report dry mouth symptoms.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists
None	8.2%	7.0%	15.0%	5.7%
1-5%	45.9%	53.5%	50.0%	34.3%
5-10%	26.5%	32.6%	10.0%	28.6%
10-20%	9.2%	2.3%	5.0%	20.0%
20-50%	9.2%	4.7%	20.0%	8.6%
>50%	1.0%	0.0%	0.0%	2.9%

[p= 0.052] p-value from chi<sup>2</sup> test

When asked what providers recommend to patients when they report dry mouth symptoms, the results were varied (see Table 15). All treatment options given are possible treatment options, with all but the recommendation of “nothing” known to benefit patients suffering from dry mouth. Two of the recommended treatments were significantly different across the provider groups: visit to the dentist and xylitol-containing products. While 56.1% of general practitioners and 43.8% of nurse practitioners recommended that patients seek care from a dentist,

only 25.7% of psychiatrists recommended this. While 43.9% of general practitioners and 31.4% of psychiatrists recommend that patients consume gums and candies containing xylitol, a compound that increases saliva production and prevents dental caries, only 6.3% of nurse practitioners reported recommending this.

Table 15: Recommendations that providers give to patients who complain about dry mouth symptoms (Non-responders removed).

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
N=	95	44	16	35	
Nothing	9.8%	7.3%	12.5%	11.4%	0.770
Fluoride treatment	3.3%	4.9%	0%	2.9%	0.638
Increase water intake	72.8%	80.5%	68.8%	65.7%	0.325
Sugar-free candy	57.6%	56.1%	43.8%	65.7%	0.327
Frequent tooth brushing	22.8%	24.4%	25.0%	20.0%	0.879
Mouth rinses	47.8%	46.3%	56.3%	45.7%	0.758
Saliva-producing medications (e.g. Saligen)	17.4%	22.0%	12.5%	14.3%	0.578
Saliva substitutes (e.g. oasis)	21.7%	17.1%	31.3%	22.9%	0.496
Visit to a dentist	42.4%	56.1%	43.8%	25.7%	0.028
Gums/candies containing xylitol	32.6%	43.9%	6.3%	31.4%	0.024

p-values from chi<sup>2</sup> test

*How often providers’ assess their patients’ oral health, and by what criteria: Questions 10 – 13*

Providers were asked how often they assess the oral health of their patients in general, and specifically their patients with mental health conditions. Responses are shown in Tables 16 and 17. Among all providers, 37.8% responded that they “often” or “always” assessed the oral health of their patients in general. However, the range across practitioner groups was substantial: 62.8% of general practitioners, 40% of nurse practitioners, and 5.7% of psychiatrists. Providers in all groups were less likely, however, to assess the oral health of their patients who were being treated for a mental health condition, with only 13.4% “often” or “always” doing so (19% general practitioners, 15% nurse practitioners, 5.7% psychiatrists).

Table 16: Frequency that providers assess the oral health of their patients.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists
Rarely	13%	5%	16%	21%
Sometimes	48%	34%	37%	73%
Often	35%	55%	47%	3%
Always	2%	5%	0%	0%

[p= <0.001] p-value from chi<sup>2</sup> test

Table 17: Frequency that providers assess the oral health of their patients, specifically those they are treating for a mental health condition.

	TOTAL	GP	NP	PSY
Rarely	34%	36%	42%	30%
Sometimes	50%	45%	37%	64%
Often	13%	16%	21%	3%
Always	1%	2%	0%	0%

[p=0.413] p-value from chi<sup>2</sup> test

The characteristics that providers utilize to assess oral health varied (and most often significantly), and can be seen in Table 18. Despite acknowledging problematic signs impacting their patient’s oral health, the majority of providers reported often not discussing these findings with their patients, as illustrated in Table 19. Of all providers, 82.1% reported rarely or sometimes discussing problematic signs, with 75.9% from general practitioners, 81.8% from nurse practitioners, and 93.8% from psychiatrists.

Table 18: Signs of oral health assessed by providers.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists	p-value
N =	54	28	9	17	
Appearance of teeth	90.7%	96.4%	100%	76.5%	0.047
Looseness of teeth	25.9%	32.1%	33.3%	11.8%	0.273
Saliva consistency	31.5%	35.7%	33.3%	23.5%	0.689
Use of a denture	44.4%	50.0%	77.8%	17.6%	0.009
Halitosis/bad breath	50.0%	53.6%	66.7%	35.3%	0.271
Missing anterior teeth	48.1%	67.9%	66.7%	5.9%	<0.001
Missing posterior teeth	44.4%	64.3%	66.7%	0%	<0.001
Lip texture	33.3%	46.4%	22.2%	17.6%	0.103
Presence of plaque	35.2%	57.1%	22.1%	5.9%	0.002
Calculus/mineralized plaque	20.4%	39.3%	0%	0%	0.002
Color/texture of mucous membranes	46.3%	67.9%	44.4%	11.8%	0.001
Color and texture of gingiva/gums	55.6%	67.9%	66.7%	29.4%	0.032

p-values from chi<sup>2</sup> test

Table 19: Frequency that providers discuss problematic oral health signs with your patients.

	TOTAL	General Practitioners	Nurse Practitioners	Psychiatrists
N =	56	29	11	16
Rarely	1.8%	3.4%	0.0%	0.0%
Sometimes	80.4%	72.4%	81.8%	93.8%
Often	14.3%	20.7%	9.1%	6.3%
Always	3.6%	3.4%	9.1%	0.0%

[p=0.571] p-value from chi<sup>2</sup> test

**Discussion:**

This study examined prescribing providers' practices surrounding the oral health of their patients with and without mental illness. Findings illustrated the complexities of treating patients and managing adverse medication side effects. There is an apparent disparity in not only evaluating oral health in the non-dental medical settings, but also in treatment and management of oral complications of medications, by some non-dental health care providers (general practitioners, nurse practitioners, and psychiatrists) in King County. The majority of providers reported that they sometimes or often evaluate the oral health of patients in their general population. When asked about what characteristics they use evaluate, however, the answers varied, with the majority (90%) reporting "appearance of teeth." It is unclear what is being evaluated in the appearance of teeth, when far fewer providers reported assessing missing teeth, presence of plaque or calculus, looseness of teeth, or saliva consistency.

Another finding was that providers were less likely to assess the oral health of their patients being treated for a mental condition than those without. Patients with mental health conditions are far more likely to have complications with their oral health (Friedlander, 2001; Stiefel et al., 1990). These patients are also known to access dental care less often (King, 1998). For this survey, we found that the participants who were non-dental providers prescribe psychotropic medications for their patients with mental illness without regularly assessing for oral health complications that may arise from the use of such medications. Further, the majority of providers report only sometimes addressing problematic oral health findings. If the patients with mental health conditions treated by these providers are less likely to seek dental care than those without mental health problems, they may leave each medical visit without knowledge of their potentially problematic oral health conditions, which in turn can affect their systemic health.

Another finding was that while the majority of providers (91.6%) report that they have at least some patients who report dry mouth, knowledge of recommended treatments appears to be lacking. Only 40% of providers recommended their patients visit the dentist. Findings indicate that non-dental health care providers are unclear about what to assess in the oral cavity and unsure how to manage xerostomia, yet are not commonly referring patients to the oral health specialist. When asked to identify common complications of xerostomia, more providers answered “no” or “uncertain” to thrush/candidiasis than correctly identifying this as a complication. Candidiasis can present throughout the body, and is often treated in the medical setting. Because this is a condition within their scope of practice elsewhere in the body, it is important for non-dental health care providers to recognize dry mouth as a potential cause of this disease within the oral cavity.

Unfortunately, decreased health care utilization and follow-up on necessary specialty referrals is not uncommon among those with mental illness. One study of Medicaid enrollees in Arizona found that those with mental health conditions utilized 20% less in health care spending, were less likely to be seen in the outpatient setting, and more likely to utilize inpatient hospital treatments (Barren et al., 1999). Along with being more likely to have diminished oral health, persons with mental health disorders are more likely to have coronary artery disease (Li et al., 2011). Another study found that while patients with mental health conditions are significantly more likely than the general population to die from ischemic heart disease or stroke, they were less likely to receive necessary treatment or surgeries (Kisely et al., 2007). Despite increased risk of chronic disease, patients with mental health conditions are less likely to be referred for discretionary, surgical procedures than those without mental health conditions (Kisely et al., 2007).

While this survey identified gaps in treatment in the non-dental setting for patients with mental health conditions, it did not allow for explanation by the providers about their practices. Some argue that patients with mental health conditions may be less likely to seek care (Li et al.,

2011). Another study found that while patients with mental health conditions were just as likely to not have insurance or to have a general practitioner, they were twice as likely to have been denied insurance coverage due to pre-existing conditions, and to have had necessary treatment delayed by their primary care physician (Druss and Rosenheck, 1998). Although this is not previously discussed in the literature, it may be that when in the health care setting, patients with mental health conditions may be less likely to discuss co-morbid conditions or health concerns, for fear of increased costs, perceived discrimination by the health care provider in lack of appointment time or interest, or lack of personal health knowledge. Others may worry about disclosing mental health or other health conditions for fear that this information may be disclosed to their employers through their insurance (Stuart, 2006). These barriers in care must be investigated further, because this vulnerable population is in great need for holistic medical care, including dental treatment.

This study identifies a number of topics for further education of non-dental health providers in assessing and managing conditions that may present in the oral cavity. While a number of providers do report assessing oral health, they may be utilizing strategies that are ineffective in identifying the patient's most important oral health needs. Further, when their patients report symptoms of dry mouth, the recommendations vary greatly. This study addresses some points of intervention that could allow non-dental health care providers to more holistically address the health care needs of their patients, both with and without mental health conditions.

There were some limitations to this survey. Although we took a representative sample of non-dental health care providers in King County, Washington, our response rate was only 41.1%. Further, although we mailed to 250 providers of the estimated 609 non-dental health care providers in King County, this is still a small sample size. Due to the limited size and response of this sample, and the diversity of the urban setting of King County, this may not be generalizable to non-dental health care providers in Washington State or other states.

**Conclusions:**

This provider survey of general practitioners, nurse practitioners, and psychiatrists illustrates the complexities of treating patients and managing adverse medication side effects. One major finding was that providers were less likely to assess the oral health of their patients being treated for a mental condition than those without. Participants in this study were prescribing psychotropic medications for their patients with mental illness, but were not regularly assessing for oral health complications that may arise from the use of such medications. Further, the majority of providers report only sometimes addressing problematic oral health findings. The patients of these providers may leave each medical visit without knowledge of their potentially problematic oral health conditions, which in turn can affect their systemic health.

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## Appendix A: Introductory Letter to Providers

Date

«Title» «FirstName» «MI» «LastName» «Suffix»

«Company»

«Address»

«Address2»

«City», «State» «Zip»

Dear «Title» «LastName»,

I am writing to ask for your help with a research study looking at what health care providers discuss with their patients about their oral health. We are looking to better understand how health care providers address medication side effects when prescribing medications for mental health problems, such as depression or anxiety. We also want to know how often providers assess patients' oral hygiene, and what methods they use to do so. This study is through the University of Washington Schools of Dentistry and Public Health, funded by NIH Grant Number TL1 RR0250160.

Your participation is very helpful in improving our understanding of the prescribing practice and oral health knowledge of health care providers. *Your participation is voluntary.* It should take approximately 5-10 minutes to complete this survey.

*We have enclosed a small token of appreciation as a way of saying thanks for your help.* Additional benefits to participating in this study include the following information sources that you may be able to use when interacting with future patients:

*An informational pamphlet about dry mouth that you can provide to patients*

*A checklist to help you assess your patients' oral health*

*Your answers to the survey questions will be connected to your name by study code only. The file of study codes and names will be encrypted and password protected on the investigator's computer. All links between data and identifiers will be destroyed by July 2011. This identification number for mailing purposes only – this is so that we may check your name off the mailing list when your survey is returned. Participation is voluntary. You can help us very much, however, by taking a few minutes to share your medication practices. If for any reason you prefer not to respond, please let us know by returning the blank survey in the enclosed stamped envelope. Potential risks of participating include breach of confidentiality and discomfort in taking part in this study. You will not be asked to discuss or identify specific patients when describing the oral health concerns of individuals taking medications for mental health problems.*

If you have any further questions, please call or e-mail using the contact information below. Consider: This study has been approved by the University of Washington Institutional Review Board, and if you have any questions about your rights in this study, you may contact them by telephone at (206) 543-0098. *Please note that we cannot guarantee the confidentiality of information sent by e-mail.*

Thank you very much for your help with our study and we look forward to receiving your response.

Many thanks,  
Nicole Murray  
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**Appendix B: 31 Question Survey**

***Survey of Providers' Assessment and Management of Patients' Oral Health with regard to Mental Health Disorders***



***A Survey of Primary Care Physicians, Nurse Practitioners, and Psychiatrists in King County***

Nicole Murray, DDS candidate (2011), MPH candidate (2012)

Lisa Heaton, PhD

David Grembowski, PhD

Linda LeResche, ScD

**University of Washington Schools of Dentistry and Public Health  
Departments of Dental Public Health Sciences and Health Services  
Seattle, Washington 98195-7475**

## INSTRUCTIONS

**Thank you for your time in filling out this survey. Your answers, along with those of other participants, will help us to better understand how health care providers address medication side effects when prescribing medications for mental health problems.**

By completing and returning the survey, you imply consent to participate. If you have any questions about completing this survey, please call 206/685/9822 and leave a message with your name and number, or e-mail [nrmurray@uw.edu](mailto:nrmurray@uw.edu). *Please note that we cannot guarantee the confidentiality of information sent by e-mail.*

## MENTAL HEALTH OF PATIENTS AND PRESCRIBED MEDICATIONS

**Q-1 About what percentage of your patients require psychotropic (i.e. medications for mental health/psychiatric disorders) medications each month?**

\_\_\_\_\_ %

**Q-2 Which of the following mental health conditions do you regularly treat in your adult (21+ years of age) patients?**

		Yes	No
1	Anxiety/Panic Disorders	___	___
2	Attention Deficit/Hyperactivity Disorder	___	___
3	Bipolar Disorder	___	___
4	Depression	___	___
5	Other Mood Disorders	___	___
6	OCD	___	___
7	Personality Disorders	___	___
8	Postpartum Depression	___	___
9	Schizophrenia/Other Psychotic disorders	___	___
10	Other: _____		

**Q-3 How often do you prescribe medications in each of the following categories?**

		Never	<2x/month	2x or more/month
1	Antipsychotics/Neuroleptics	___	___	___
2	Atypical Antidepressants	___	___	___
3	Atypical Antipsychotics	___	___	___
4	Anticonvulsants	___	___	___
5	Benzodiazepines	___	___	___
6	Psychostimulants	___	___	___
7	MAOIs (e.g., Phenelzine (Nardil))	___	___	___
8	SSRIs (e.g., Sertraline (Zoloft))	___	___	___
9	Tricyclics (e.g., Imipramine (Tofranil))	___	___	___

**Q-4 Which of the following specific medications do you prescribe at least twice a month?**

	<b>Yes</b>	<b>No</b>
1 Alprazolam (Xanax)	_____	_____
2 Amitriptyline	_____	_____
3 Amphetamine (Adderall)	_____	_____
4 Aripiprazole (Abilify)	_____	_____
5 Bupropion (Wellbutrin)	_____	_____
6 Clozapine (Clozaril)	_____	_____
7 Diazepam (Valium)	_____	_____
8 Duloxetine (Cymbalta)	_____	_____
9 Carbamazepine (Tegretol)	_____	_____
10 Fluoxetine (Prozac)	_____	_____
11 Gabapentin (Neurontin)	_____	_____
12 Haloperidol (Haldol)	_____	_____
13 Imipramine (Tofranil)	_____	_____
14 Lithium	_____	_____
15 Lorazepam (Ativan)	_____	_____
16 Paroxetine (Paxil)	_____	_____
17 Isocarboxazid (Marplan)	_____	_____
18 Methylphenidate (Ritalin)	_____	_____
19 Nortriptyline	_____	_____
20 Phenelzine (Nardil)	_____	_____
21 Risperdal (Risperidone)	_____	_____
22 Sertraline (Zoloft)	_____	_____
23 Topiramate (Topamax)	_____	_____
24 Valproic Acid (Depakene)	_____	_____
25 Venlafaxine (Effexor)	_____	_____

## SIDE EFFECTS

**Q-5** When prescribing, which of the following side effects do you consider most frequently? Please rank the top 5 side effects from 1-to-5, with 1 being the most frequent.

### RANK

- \_\_\_ Anxiety
- \_\_\_ Aggressive Behavior
- \_\_\_ Dizziness
- \_\_\_ Fainting
- \_\_\_ GI Disruptions
- \_\_\_ High Blood Pressure
- \_\_\_ Memory Impact
- \_\_\_ Renal Failure
- \_\_\_ Seizures
- \_\_\_ Sexual Dysfunction
- \_\_\_ Skin Irritation
- \_\_\_ Sleep Disturbances
- \_\_\_ Tremors
- \_\_\_ Trouble Breathing
- \_\_\_ Vision Changes
- \_\_\_ WBC Dysfunction
- \_\_\_ Weight Changes
- \_\_\_ Xerostomia (dry mouth)
- \_\_\_ Other: \_\_\_\_\_

## DRY MOUTH

**Q-6 To your knowledge, which of the following are associated with xerostomia (dry mouth)?**

		YES	NO	UNSURE
1	Patient annoyance	_____	_____	_____
2	Halitosis/bad breath	_____	_____	_____
3	Burning Mouth Syndrome	_____	_____	_____
4	Hoarseness	_____	_____	_____
5	Caries (tooth decay)	_____	_____	_____
6	Periodontal disease	_____	_____	_____
7	Taste disruption	_____	_____	_____
8	Cotton mouth	_____	_____	_____
9	Pulpal (tooth nerve) pain	_____	_____	_____
10	Sores in mouth	_____	_____	_____
11	Difficulties with dentures	_____	_____	_____
12	Cracked lips	_____	_____	_____
13	Staining of teeth	_____	_____	_____
14	Saliva changes	_____	_____	_____
15	Increased prevalence of thrush/candidiasis	_____	_____	_____

**Q-7 How often do you discuss the side effects of dry mouth with patients before you prescribe a medication that may cause dry mouth?**

- 1 Never
- 2 Sometimes
- 3 Often
- 4 Always

**Q-8 What percentage of *all of your* patients report dry mouth symptoms?**

- 1 None
- 2 1-5%
- 3 5-10%
- 4 10-20%
- 5 20-50%
- 6 >50%

**Q-9 If a patient complains of dry mouth symptoms, what do you recommend (*circle all that apply*)?**

- 1 Nothing
- 2 Fluoride treatment
- 3 Increase water intake
- 4 Sugar-free candy
- 5 Frequent tooth brushing
- 6 Mouth rinses
- 7 Saliva-producing medications, e.g. Salagen
- 8 Saliva substitutes, e.g. Oasis
- 9 Visit to a dentist
- 10 Gums/candies containing xylitol

## ORAL HEALTH

*Unless otherwise noted, the following questions refer to your general patient population.*

**Q-10 In general, how often do you assess the oral health of your patients?**

- 1 Never
- 2 Sometimes
- 3 Often
- 4 Always

**Q-11 How often do you assess the oral health of your patients you are treating for a mental health condition?**

- 1 Never
- 2 Sometimes
- 3 Often
- 4 Always

**Q-12 If you do, what signs of oral health do you assess? (*circle all that apply*)**

- 1 Appearance of teeth
- 2 Looseness of teeth
- 3 Saliva consistency
- 4 Use of a denture
- 5 Halitosis/bad breath
- 6 Missing anterior teeth
- 7 Missing posterior teeth
- 8 Lip texture
- 9 Presence of plaque
- 10 Calculus/mineralized plaque
- 11 Color/ texture of mucous membranes
- 12 Color and texture of gingiva/gums
- 13 Other: \_\_\_\_\_

**Q-13 How often do you discuss problematic oral health signs with your patients?**

- 1 Never
- 2 Sometimes
- 3 Often
- 4 Always

## PATIENT CHARACTERISTICS

**Q-14** How many minutes, on average, do you spend with a patient?

\_\_\_\_\_ Minutes

**Q-15** About what percentage of your patients are female?

\_\_\_\_\_ Percent

**Q-16** About what percentage of your patients are non-white?

\_\_\_\_\_ Percent

**Q-17** About what percentage of your patients are 65 years of age or older?

\_\_\_\_\_ Percent

**Q-18** About what percentage of your patients wears dentures (partial or complete)?

\_\_\_\_\_ Percent

**Q-19** About what percentage of your patients are from middle or upper class households?

\_\_\_\_\_ Percent

**Q-20** About what percentage of your patients are Medicaid patients?

\_\_\_\_\_ Percent

**Q-21** About what percentage of your patients take 3 or more different medications a day?

\_\_\_\_\_ Percent

## PROVIDER CHARACTERISTICS

**Q-22** About how many hours do you usually work per week?

\_\_\_\_\_ Hours

**Q-23** For about what percentage of your patients do you serve as their primary care provider (that is, they receive most of their care from you)?

\_\_\_\_\_ Percent

**Q-24** How many years have you been in your current profession?

\_\_\_\_\_ Years

**Q-25** How many years have you been practicing in King County?

\_\_\_\_\_ Years

**Q-26** How many years have you been in your current office location?

\_\_\_\_\_ Years

**Q-27** Do you have a close relationship with a dental professional (colleague, family member, friend, or neighbor), with whom you can discuss oral health issues?

1 Yes

2 No

**Q-28** Which of the following best describes your ethnic group (please circle one number only)?

1 Hispanic or Latino

2 Not Hispanic or Latino

**Q-29** Which of the following best describes your racial group (please circle one number only)?

1 American Indian/Alaska Native

2 Asian

3 Native Hawaiian or other Pacific Islander

4 Black or African American

5 White

6 More than one race

7 Other: \_\_\_\_\_

**Q-30** What is your gender?

1 Male

2 Female

**Q-31** What is your age?

\_\_\_\_\_ Years

Is there anything we may have overlooked? Please use this space for any additional comments.

---

Please Note: before returning the survey, please check to see that you didn't skip any pages, and that you answered all the questions you intended to answer.

Check here if you'd be interested in having an in-office training lecture on dry mouth management.

We greatly appreciate your contribution to this effort! If you would like a summary of results, please print your name and address on the back of the return envelope. We will see that you receive it.

Oral Health Survey  
University of Washington  
Box 357475  
Seattle, WA 98195-7475

## Appendix C: Second Letter to Providers

Date

«Title» «FirstName» «MI» «LastName» «Suffix»  
«Company»  
«Address»  
«Address2»  
«City», «State» «Zip»

Dear «Title» «LastName»,

About three weeks ago, you received a research survey regarding the oral health of patients taking psychotropic medications. To the best of our knowledge, we have not yet received your completed survey. If you have already completed and returned your survey, thank you for your participation and kindly disregard this letter.

The comments of providers who already responded are showing a variety of practice patterns. We are writing again because of the importance that your survey has for helping us get accurate results. *Your participation is voluntary.* It's only by hearing from nearly everyone in the sample that we can be sure that the results are truly representative.

Your participation is very helpful in improving our understanding of the prescribing practice and oral health knowledge of health care providers. It should take approximately 5-10 minutes to complete this survey.

Benefits to participating in this study include the following information sources that you may be able to use when interacting with future patients:

*An informational pamphlet about dry mouth that you can provide to patients*  
*A checklist to help you assess your patients' oral health*

*Your answers to the survey questions will be connected to your name by study code only. The file of study codes and names will be encrypted and password protected on the investigator's computer. All links between data and identifiers will be destroyed by July 2011. This identification number for mailing purposes only – this is so that we may check your name off the mailing list when your survey is returned. Participation is voluntary. You can help us very much, however, by taking a few minutes to share your medication practices. If for any reason you prefer not to respond, please let us know by returning the blank survey in the enclosed stamped envelope. Potential risks of participating include breach of confidentiality and discomfort in taking part in this study. You will not be asked to discuss or identify specific patients when describing the oral health concerns of individuals taking medications for mental health problems.*

If you have any further questions, please call or e-mail using the contact information below. This study is through the University of Washington Schools of Dentistry and Public Health, funded by NIH Grant Number TL1 RR0250160. Consider: This study has been approved by the University of Washington Institutional Review Board, and if you have any questions about your rights in this study, you may contact them by telephone at (206) 543-0098. *Please note that we cannot guarantee the confidentiality of information sent by e-mail.*

Thank you very much for your help with our study and we look forward to receiving your response.  
Many thanks,

Nicole Murray  
DDS (2011)/MPH (2012) candidate  
UW School of Dentistry  
206-685-9822; nrmurray@uw.edu

Lisa Heaton, Ph.D.  
Acting Assistant Professor  
Dental Public Health Sciences  
206-221-6293; lheaton@uw.edu

## Appendix D: Thank you Letter

Date

«Title» «FirstName» «MI» «LastName» «Suffix»  
«Company»  
«Address»  
«Address2»  
«City», «State» «Zip»

Dear «Title» «LastName»,

I am writing to thank you for your help with our research study, which looked at what health care providers discuss with their patients about their oral health. With your help, we are on the way to better understanding how health care providers address medication side effects when prescribing medications for mental health problems, such as depression or anxiety, along with knowing how often providers assess patients' oral hygiene, and what methods they use to do so. This study is through the University of Washington Schools of Dentistry and Public Health, funded by NIH Grant Number TL1 RR0250160.

*We have enclosed a two token of appreciation as a way of saying thanks for your help, which you may be able to use when interacting with future patients:*

*An informational pamphlet about dry mouth that you can provide to patients  
A checklist to help you assess your patients' oral health*

*As a reminder, all links between data and identifiers will be destroyed by July 2011. If you have any further questions, please call or e-mail using the contact information below. Consider: This study has been approved by the University of Washington Institutional Review Board, and if you have any questions about your rights in this study, you may contact them by telephone at (206) 543-0098. Please note that we cannot guarantee the confidentiality of information sent by e-mail.*

Thank you very much for your help with our study!







Many thanks,

Nicole Murray  
DDS (2011)/MPH (2012) candidate  
UW School of Dentistry  
206-685-9822; nrmurray@uw.edu

Lisa Heaton, Ph.D.  
Acting Assistant Professor  
Dental Public Health Sciences  
206-221-6293; lheaton@uw.edu

Appendix E: Oral Health Pamphlet

### What can I do?

- DRINK WATER**  
helps to keep the mouth clean 
- DENTAL VISITS**  
twice a year for cleanings and exams. 
- TOOTH BRUSHING**  
after every meal (not just twice a day) and **FLOSSING** every night 
- LIMIT CARBOHYDRATES**  
(sugar) the bacteria that cause tooth decay also love these meals 
- AVOID SODAS**  
which can increase decay with their high sugar and acid contents 
- QUIT SMOKING**  
this will help improve your gum health 


Find an American Dental Association (ADA) Dentist:  
<http://ada.org/public/directory/index.asp>

For Reduced-Cost Dental Care:  
<http://www.wak.org/reduced-cost-dental-care>

For information from the Seattle-King County Dental Association:  
<http://skcds.org>

Tobacco Quit-Line:  
1-800-QUIT-NOW

## DRY MOUTH



### What is it?

### Do I have it?


### &

### What do I do now?

### What is Dry Mouth?

#### How do I know if I have it?

Dry mouth, or xerostomia, is dryness of the mouth, caused by a decrease in saliva.



Signs that you may have a dry mouth include:

- Feeling that you don't have enough saliva, or "cotton mouth"
- Difficulties with chewing, swallowing, or speaking without drinking liquid
- Lots of new cavities
- Difficulties with denture
- Sense that your saliva or plaque (film) is thicker or stickier
- Drying/cracking of lips

#### How do I get dry mouth?

The three most common ways to get dry mouth are:

1. Medications that decrease saliva
2. Certain autoimmune conditions, like Sjogren's syndrome
3. Radiation treatment for head/neck cancer

Many medications used to treat mental health disorders, including antipsychotics, anti-manic, and antidepressants can cause dry mouth in about 1 in 5 individuals.

Psychological disorders, like depression and anxiety, can also contribute to dry mouth, with changes to the saliva, diet, and hygiene.

#### How does Dry Mouth Impact my Oral Health?

Dry mouth can cause:

- Tooth decay (cavities)
- Gum disease
- Dryness of gums and inner cheeks
- Cracks on the corners of the mouth
- Deep grooves of the tongue
- Burning sensation in the mouth
- Oral yeast (thrush—a fungal infection)
- Tooth decay (cavities)
- Gum disease

## Appendix F: Oral Health Checklist

### Assessment of Oral Hygiene

- Appearance of teeth – Are teeth stained, broken, or covered in plaque/debris?
- Looseness of teeth - Are the teeth visibly mobile? Does the patient complain of difficulty in chewing?
- Saliva consistency – Does saliva look opaque/yellow? Is it ropy?
- Use of a denture – Does the patient wear it while they sleep? Do they complain that it doesn't stay in?
- Halitosis/bad breath – Can you smell their breath when sitting 5 feet away? 10 feet away?
- Missing anterior teeth - Due to trauma or decay? Is this a new change?
- Missing posterior teeth – Same as above. Does the patient struggle with eating?
- Lip texture – Are lips cracked? Do they have an accumulation of white in corners?
- Presence of plaque – Is white or yellow soft material visible on the teeth?
- Presence of Calculus/Mineralized Plaque – Is white/yellow/brown firm material adhered to the teeth?
- Color and texture of mucous membranes – Does the tissue look folded? Does it have white striations?
- Color and texture of gingiva/gums – Are gums soft, inflamed, or red in appearance? Are they bleeding?

For more information on oral hygiene: [ada.org](http://ada.org)

### Recommendations to Improve Oral Hygiene

- Biannual visits to dentist for cleanings and exams
- Brushing twice a day
- Flossing at night
- Avoid sugary foods/drinks
- Drink lots of water
- Use a mouthguard when playing sports
- Smoking cessation
- To find a dentist in your area, visit [ada.org](http://ada.org).
- For Reduced Cost Dental Care, visit: <http://www.wsda.org/reduced-cost-dental-care/>
- Tobacco Quit-Line: 1-800-QUIT-NOW

## **Acknowledgements**

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Another big thank you to my family who spent countless hours preparing all of these surveys and packets for the multiple mailings.

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