The practice of oral medicine in the United States in the twenty-first century: an update

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Objective. The aim of this study was to describe the practice characteristics of Oral Medicine trained dentists in the United States.

Methods. This study was a cross-sectional survey of members of the American Academy of Oral Medicine. Patient demographic characteristics, referring providers, medical comorbidities, diagnoses, and practitioner information were collected during a 5-day practice week. The survey was open during the years 2011 and 2012.

Results. Information from 916 patients was entered by 74 practitioners from 20 states. The mean number of practitioners seen before consulting Oral Medicine providers was 2.2, and patients had experienced symptoms for 16.8 months before the initial encounter. Common chief complaints were nonulcerative mucosal lesions, orofacial pain, and dry mouth. Patients with cardiovascular disease were at a higher risk of developing lichenoid lesions, and those with psychiatric conditions were at higher risk of reporting burning mouth symptoms.

Conclusions. Diagnoses and procedures performed by Oral Medicine practitioners complement practice characteristics of general and specialty dentists in the United States. (Oral Surg Oral Med Oral Pathol Oral Radiol 2015;119:408-415)

The field of Oral Medicine is defined as the oral health care of patients with medically complex conditions and the diagnosis and primarily nonsurgical management of medically related conditions affecting the oral and maxillofacial complex.[1] Oral Medicine is considered a distinct specialty of dentistry in many parts of the world and includes the management of oral and maxillofacial manifestations of mucocutaneous disease, orofacial pain, and salivary gland dysfunction, as well as the dental management of patients with complex medical disorders.[2] The practice of Oral Medicine in the United States dates to 1945, with the establishment of the American Academy of Oral Medicine (AAOM). Contributions of Oral Medicine to oral and medical care include an improved understanding of the etiopathogenesis of oral mucosal lesions and the testing of new therapies; the description and development of novel treatments for disorders causing orofacial pain; and the acquisition of deeper knowledge regarding the genetic basis of oral cancer, among others.[3-9] In addition, the field of salivary diagnostics and biomarkers has progressed over the past decade to provide insight into the detection and management of select oral and systemic diseases.[10] Recent statistics demonstrate a growing population suffering from oral diseases, including oral cancer and systemic conditions affecting the oral and maxillofacial region, chronic oral mucosal disorders, and chronic disabling diseases.[11]

In response to these growing oral health and medical needs, the scope and demand for Oral Medicine services has developed substantially. A study performed in 1996 reported that most persons diagnosed and managed in Oral Medicine clinics had medically compromising conditions, oral mucocutaneous lesions, or chronic orofacial pain conditions.[12] A follow-up 2001 publication, based on national epidemiologic survey data, forecasted an increased need for Oral Medicine services in the United States.[13] A more recent international survey of Oral Medicine practitioners regarding their practice and training (distributed in 2010) suggested that more than 88% of respondents considered management of oral mucosal disease, salivary dysfunction, oral manifestations of systemic diseases, and facial pain within the definition and scope of Oral Medicine practice.[2] The present represents a follow-up study to the original 1996 publication addressing Oral Medicine practice in the United States. This study provides information about how this

Statement of Clinical Relevance

The practice of Oral Medicine in the United States includes diagnoses and procedures that complement other disciplines of dentistry and medicine. This study reflects the current practice of Oral Medicine in the United States.

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field is being practiced among other areas of dentistry and medicine in the current decade and describes contemporary changes in the conditions being referred to Oral Medicine practitioners.

OBJECTIVE

The main objective of this study was to identify clinical services provided by members of the AAOM, including diplomate members, and describe oral medicine practice characteristics. Among these, we collected information on the most frequent encountered diagnoses, the number of health care providers seen before consultation, type of chief complaint and length of time patients experienced the complaint before Oral Medicine consultation, the anatomic orofacial distribution of the chief complaint, and the types of referring doctors. Our group also intended to evaluate the association between systemic and oral diseases in this patient population. Thus, we explored the association between medical comorbidities and common Oral Medicine diagnoses.

METHODS

A prospective survey of Oral Medicine practitioners was implemented to include significant practice and patient characteristics, based on previous publications that addressed broad clinical areas.[2,14-17] The study protocol was approved by the University of Kentucky Institutional Review Board (11-0071-X2 B), and distributed electronically to active members of the AAOM (March 2011-June 2012) and to the attendees of two AAOM annual scientific meetings (2011 and 2012). The electronic version used standard polling software (Zoomerang, Palo Alto, CA) and a link posting on the AAOM website. All providers were asked to record the following patient information for a 5-day practice week (consecutive patients notwithstanding degree of complexity): demographic characteristics, medical comorbidities, visit diagnosis (International Classification of Diseases, ninth revision [ICD-9]), referral source, presenting symptoms, anatomic location, procedures (current procedural terminology [CPT], current dental terminology [CDT]), number of practitioners seen before consultation, and duration of the chief complaint. Practitioner-specific questions included the number of days designated for clinical practice per month, location of practice, and setting (dental school, hospital, multiple locations, or private practice only). Each participant was requested to complete the survey without providing any patient identifiers and only once from the primary practice location. Responses to the survey were forwarded to the AAOM executive director, who reviewed the data for anonymity before saving in a firewall- and password-protected database accessible only to the study team.

The primary unit of analysis was the individual patient. Practitioner information was used to characterize the distribution of respondents. Data were analyzed with descriptive statistics and bivariate analysis (Chi square) to explore the associations between systemic diseases and Oral Medicine diagnoses. All analyses were done in Stata version 12.0 (Statacorp LP, College Station, TX).

RESULTS

Information from 916 patients was entered by 74 practitioners from 20 states, for a return rate of 15% (Table I). Sixty-two (83.3%) providers were certified by the American Board of Oral Medicine. The mean number of clinical practice days per month was 10 (95% confidence interval [CI]: 8.7-10.26). Forty-six percent of respondents practiced mainly at a dental school faculty practice, and 31% practiced mainly at a hospital setting. Eighteen percent practiced in combined settings, and 5% were in private practice in an ambulatory setting. The characteristics of referring providers to Oral Medicine services are described in Table II. The majority of referrals (67.5%) to Oral Medicine clinicians originated from general dental practitioners and physician specialists. Among the physician specialists, 41% were otolaryngology specialists, 24% were hematologists, oncologists, or radiation oncologists, 22% were rheumatologists, and 13% were dermatologists.

A total of 596 (65.1%) females and 313 (34.17%) males were entered into the survey. The mean age was of 57 years (standard deviation [SD]: 17.3; 95% CI: 55.5-57.8). The majority of patients (74%) were Caucasian, followed by African Americans (12.8%) and Hispanics (8.8%). Patients had seen, on average, 2.2 (95%CI: 2.09-2.31) practitioners before consulting the current clinician and had experienced orofacial symptoms for a mean of 16.8 months (95% CI: 15.4-18.3). The most frequent reasons for consultation were oral lesions (mass/white/red) (n = 313), orofacial pain (n = 113), dry mouth (n = 85), burning mouth (n = 85), and oral ulcers or sores (n = 79) (Table III). Thirty-five percent had symptoms in two or more intraoral or extraoral locations. Common intraoral locations were the tongue and gingiva (cumulative proportion of combined tongue and gingival sites: 28.6%), followed by teeth (10%), buccal mucosa (7.8%), and lips (5.3%). Eight percent of the subjects reported extraoral location of symptoms (facial, cervical, temporomandibular, and salivary).

Table IV describes the distribution of clinical diagnoses, and Table V describes the reported procedures performed in Oral Medicine clinics. The most common diagnosis was oral lichen planus (16.6%), followed by disturbances of salivary gland function (7.1%). Reported procedures were most often

Table I. Geographic representation of respondents

State	Frequency	Percentage*	Cumulative
California†	94	10.78	10.78
Mississippi	85	9.75	20.53
Massachusetts†	78	8.94	29.47
Florida	52	4.35	33.82
Minnesota†	51	5.84	39.66
Pennsylvania†	51	5.84	45.50
Washington†	34	3.89	49.39
Kentucky	26	2.98	52.37
New York†	26	2.98	54.75
North Carolina†	15	1.72	56.47
New Jersey†	15	1.72	58.19
Washington DC	12	1.38	59.57
Ohio	9	1.03	60.60
Tennessee	7	0.80	61.40
Illinois	2	0.23	61.63
Nebraska	2	0.23	61.96
Georgia	1	0.11	62.07
Nevada	1	0.11	62.18
Arizona	1	0.11	62.29
Texas	1	0.11	62.40

*Based on complete and imputed entries by Internet Protocol address for 563 patients. Percentages are rounded. Cumulative percentile refers to total sample (916 patients). Data were not available for 353 patients (37.6%).
†States with oral medicine training programs (fellowship or residency).

Table II. Type of referring health provider*

Doctor	Frequency	Percentage	Cumulative frequency
General dentist	345	42.75	345
Physician specialist	200	24.78	545
Dental specialist	101	12.51	646
Primary care physician	70	8.67	716

*Based on entries for 716 patients. Data were not available for 200 patients.

brief office visits (33.6%), followed by soft tissue biopsies (38.6%). Many patients had multiple systemic diagnoses in our sample, with 182 patients having at least two systemic medical chronic comorbidities. The most common medical comorbidity among patients was cardiovascular disease (n = 169), followed by endocrine (n = 89), rheumatologic (n = 76), digestive (n = 63), and psychiatric (n = 39) disorders. Patients with cardiovascular disease were more likely to have lichenoid lesions (odds ratio [OR]: 8.23; 95% CI: 5.76-11.77; $P < .001$), and those with psychiatric disorders were more likely to have glossodynia (OR = 3.3; 95% CI: 1.75-3.2; $P < .001$) (Table VI).

DISCUSSION

This study represents a contemporary cross-section of the practice of Oral Medicine in the United States. Twenty geographically diverse locations were utilized,

Table III. Presenting symptom or reason for consultation*

Symptom	Frequency	Percentage	Cumulative percentage
Oral lesions (mass/white/red)	313	39.37	39.37
Oral/facial/dental pain	113	14.21	53.58
Dry mouth	85	10.69	64.28
Burning mouth	85	10.69	74.97
Oral ulcers/sores	79	9.94	84.91
None	37	4.65	89.56
Follow-up LP/MMP/PV	37	4.65	94.21
Oncology†	27	3.40	97.61
Halitosis, dental issues	10	1.26	98.87
ONJ due to medication	6	0.75	99.62
OSA	3	0.38	100

LP, lichen planus; *MMP*, mucous membrane pemphigoid; *PV*, pemphigus vulgaris; *ONJ*, osteonecrosis of the jaw; *OSA*, obstructive sleep apnea.
*Based on entries for 795 patients. 37 patients were asymptomatic at clinic presentation or consultation. Data were not available for 221 patients.
†Oncologic consultations included prechemotherapy, preradiation oral evaluation, and consultation for complications of oncologic treatment.

involving 916 patients seen by 74 practitioners during a typical work week in 2011 and 2012. As a result, insight was gained about patient characteristics, duration and location of complaint, referral patterns, diagnoses rendered, and clinical evaluations and procedures provided.

Surveys of referral patterns and patient characteristics are important to profile the practice of a discipline.[18] Such studies identify concentration areas and inform directors of training programs about experience and content for resident and student teaching.[19] These studies also help define practices related to a specific field and analyze factors associated with referral patterns. The results of our survey support the fact that postdoctoral training in Oral Medicine is a predictor for increased delivery of services because a greater number of patients in the database were from states with formal postdoctoral training programs in Oral Medicine. Forty-five percent of the sample included practitioners from six states. Four of these have postdoctoral fellowship or residency training programs in Oral Medicine.

Referral sources for Oral Medicine care in this sample were mostly general dental practitioners (42.75%), and this highlights the referral nature of the practice of the discipline in the United States. Studies assessing the referral practice of general dentists to specialists underscore the impact of individual postdoctoral training, hours of continuing education, perceptions of the quality of undergraduate training in the specialty area, and disease severity on the decision process to refer a patient to specialty

Table IV. Frequency of use of diagnostic code by oral medicine practitioners*

Code	Diagnosis	Frequency	Percentage	Cumulative frequency	Cumulative percentage
697.0	Lichen planus	152	16.6	152	16.60
527.7, 527.2, 527.6, 527.9	Disturbance of salivary secretion, adenitis, mucoceles	65	7.10	207	23.70
522.6, 523.1, 523.3, 523.4, 523.8, 523.9, 522.0	Acute and chronic gingival and periodontal disease, pulpitis, caries, apical periodontitis	52	5.68	259	29.38
710.2	Sjögren syndrome	46	5.02	305	34.40
528.6	Leukoplakia	42	4.58	347	38.98
141.0, 141.2, 141.3, 141.9, 143.0, 143.1, 144.9, 145.0, 145.1, 145.2, 145.3, 145.4, 145.9, 146.0, 147.9, 160, 161.1, 161.9, 162.9, 174.9, 185.0	Malignant neoplasms of the oral cavity, pharynx, lung, breast, prostate	39	4.26	386	43.24
694.4	Pemphigus	38	4.15	424	47.39
529.6	Glossodynia	36	3.93	460	51.32
210.4	Benign neoplasm	30	3.28	490	54.60
528.0	Stomatitis	22	2.40	512	57.00
112.0	Candidiasis	22	2.40	534	59.40
528.2	Oral aphthae	19	2.07	553	61.47
524.6, 524.62, 524.63, 718.08	Temporomandibular disorders, arthralgia	19	2.07	572	63.54
728.85, 729.1	Myalgia, muscle spasm	18	1.97	590	65.51
203	Immune proliferative disorders	17	1.85	607	67.36
529.0, 529.1	Tongue conditions	15	1.64	622	69.00
350.1, 350.8, 350.9	Trigeminal neuralgia, trigeminal neuropathy	8	0.88	630	69.88
350.2	Atypical facial pain	8	0.88	638	70.76

*Based on entries for 708 patients. Percentages are rounded. Data were not available for 208 patients. Cumulative percentile refers to total sample (916 patients). Codes were grouped by specific diagnostic areas. Not shown in the table are the diagnoses with less than 0.88% frequency that amounted to 7.64%.

care.[15,17] In contrast, dental specialists referred less frequently to Oral Medicine practitioners. Although the reason for this is not clear, it is possible that one of the following four factors may be contributors: (1) non−Oral Medicine dental specialists may have comfort in their ability to manage these patients and not see the need for a referral; (2) local Oral Medicine practitioners may not be well known in their community; (3) the types of patients described herein are more common in general dentistry than in specialty dentistry; or (4) non−Oral Medicine dental specialists may believe that these types of patients may not benefit from a referral to an Oral Medicine practice. Of note, 44.74% of referrals were made by physicians, an interesting finding that supports studies about physician training in the assessment of the oral cavity and their limited knowledge about common soft oral tissue pathology.[19,20] Also of note, specialty physicians (41% were otolaryngology surgeons) were the major source of referrals to Oral Medicine services, underscoring the role of the field as an area of complementary expertise to specialty medical care. The low proportion of primary care referring physicians points to the need for incorporating Oral Medicine training into primary care medical residencies and practice. Thus, it appears that the practice of Oral Medicine provides a bridge between the fields of dentistry, and medicine and patients would benefit from a closer working relationship between Oral Medicine specialists and physicians whether in general or specialty practice.

Several studies have assessed referral patterns, service use, and scope of patients seen in Oral Medicine settings.[14,16,21,22] An Australian study published in 2008, with results consistent with ours, reported mucosal and salivary disorders and burning mouth syndrome as often-encountered diagnoses.[16] The Australian study evaluated referral patterns and patient characteristics in hospital and private practice settings. Patient demographic characteristics were similar to our survey findings, as were the most frequent medical comorbidities (cardiovascular and endocrine). The referral sources were mostly

Table V. Common evaluation or treatment procedures*

Code	Procedure	Frequency	Percentage	Cumulative frequency	Cumulative percentage
D0140	Limited oral evaluation	195	22.92	195	22.92
99201	Problem focused new patient visit	48	5.64	243	28.56
99212	Brief office visit established patient	43	5.05	286	33.61
D7286, 40808, 11100, 40490, 42405	Biopsy of oral soft tissue, mucous membrane, lips, incisional biopsy	42	5.06	328	38.67
99241, 99243	Office consults new or established patient	58	6.82	386	45.49
99213	Established outpatient visit (level 3)	24	2.82	410	48.31
99203	New patient visit (level 3)	21	2.7	431	51.10
99214	Office visit (level 4)	19	2.23	450	53.24
99204	New patient visit (level 4)	13	1.53	463	54.77
41899	Unlisted procedure: dentoalveolar structures	11	1.29	474	56.06
70355	Panoramic radiography	7	0.82	481	56.88
99211	Established outpatient (level 1)	7	0.82	488	57.70
99244	Office consult new patient (level 4)	7	0.82	495	58.52
99205	New patient visit (level 5)	5	0.59	500	59.11
99242	Office consult (level 2)	5	0.59	505	59.70
99215	Office visit (level 5)	3	0.35	508	60.50
99202	New patient visit (level 2)	2	0.24	510	60.29
41827	Excision of tumor with complex repair	1	0.12	511	60.41
70543	Magnetic resonance imaging of face and neck with and without contrast	1	0.12	512	60.53
99231	Subsequent hospital care	1	0.12	513	60.65

*Based on entries for 513 patients. Percentages are rounded. Data was not available for 403 patients. Cumulative percentile refers to total sample (916 patients).

general dentists. A study published in 2009 described referral patterns and patient characteristics of three Oral Medicine consultants in the Republic of Ireland.[14] Of the 378 patients, 73.8% were referrals from dental practitioners. Common diagnoses included mucosal lesions (white lesions and ulcers) and facial pain; 65.6% of the Irish sample was female compared with 65.4% in our study. Together, these studies create a profile of patients who are referred to Oral Medicine clinicians. The majority are female, with a wide age distribution, predominantly in the fifth decade of life.

Additional assessments of Oral Medicine practice in the United States identified practice parameters and the need and demand for Oral Medicine clinicians.[14,16,18,19,23] A study published in 1997 reported the findings of a survey of 50 clinicians attending the 1996 annual meeting of the American Academy of Oral Medicine.[12] The percentage of diplomates among respondents was 74% compared with the 82% in this study. Demographic patient characteristics were almost identical in both samples, with similar reported ranges and means (56 years in 1996 and 57 years in 2012) and race distribution. The majority of patients were Caucasian, followed by African Americans and Hispanics (in both samples). Among conditions treated by Oral Medicine clinicians, both studies offered similar results, with a reported increase in the number of salivary disorders and oncology-related dental and oral complications in 2012 compared with 1996. Moreover, dental and periodontal diseases in patients with medically complex conditions and orofacial pain disorders were some of the most frequently treated conditions. Mucosal disorders occupied the highest rank among diagnoses in our sample, in agreement with other site-specific reports of patient diagnoses seen in Oral Medicine practice in the United States.[24,25] Reported procedures in our survey as well as in other studies[14,16,22] included nonsurgical treatment, with diagnosis of mucosal disease occupying the highest frequency, followed by recurrent visits for management of other chronic orofacial disease. The referral-based practice of Oral Medicine is supported by very similar referral sources in both surveys. Patients in

Table VI. Association of common systemic diseases to oral medicine diagnoses*

Medical disorder	*Oral diagnosis*	*Frequency*	*Relative risk and 95% confidence interval*
Cardiovascular disease	Lichen planus	142	8.23 (5.76-11.77) $P < .001$
	Salivary disorders	16	.72 (0.46-1.14) $P = .14$
	Sjögren syndrome	14	.66 (.42-1.03) $P = .04$
	Leukoplakia	9	.45 (.25-.82) $P = .001$
	Glossodynia	7	.41 (.21-.82) $P = .002$
Endocrine disease	Lichen planus	24	.55 (.36-.84) $P = .004$
	Salivary disorders	8	.15 (.074-.30) $P < .001$
	Sjögren syndrome	10	.92 (.51-1.64) $P = .77$
	Leukoplakia	3	.28 (.093-.85) $P = .008$
	Glossodynia	1	.11 (.015-.75) $P = .002$
Rheumatologic disease	Lichen planus	12	2.25 (1.59-4.08) $P < .001$
	Salivary disorders	17	1.73 (1.08-2.78) $P = .02$
	Sjögren syndrome	24	3.35 (2.31-4.86) $P < .001$
	Leukoplakia	2	.22 (.05-.85) $P = .008$
	Glossodynia	3	.39 (.13-1.18) $P = .06$
Digestive disease†	Lichen planus	10	.28 (.15-.54) $P = .001$
	Salivary disorders	10	.91 (.49-1.70) $P = .77$
	Sjögren syndrome	12	1.71 (.98-2.96) $P = .06$
	Glossodynia	10	1.8 (1.01-3.23) $P = .06$
Psychiatric disease‡	Lichen planus	4	.15 (.05-.42) $P < .001$
	Salivary disorders	3	.40 (.13-1.27) $P = .09$
	Leukoplakia	2	.01 (.003-.05) $P < .001$
	Glossodynia	10	3.3 (1.75-3.20) $P < .001$

*There were less than five overall comorbid events for pemphigus (frequent oral medicine diagnosis).
†There were no cases of leukoplakia in the digestive disease category.
‡There were no cases of Sjögren syndrome in the psychiatric disease category. Table is based on ICD-9 codes: 697.0 for lichen planus, 527.2, 527.6, 527.6, 527.9 for salivary disorders, 710.2 for Sjögren syndrome, 528.6 for leukoplakia, and 529.6 for glossodynia.

our study averaged approximately 17 months with their unresolved complaints before consulting an Oral Medicine practitioner, in agreement with patterns elegantly depicted by previous studies performed in the United Kingdom and Australia.[16,22]

Most diagnostic and procedural codes reported in our study represent nontraditional dental procedures and dental diagnoses. The only ICD-9 codes corresponding to general dentistry were pulpitis, periodontal disease, and caries (Table IV), but in this patient group, the codes uniquely corresponded with the oral health care of patients with medical disorders. The procedures reported in Table V confirm the nonsurgical character (with the exception of biopsies) of Oral Medicine practice. Oral Medicine practitioners also provide care for chronic diseases, such as mucosal (i.e., vesiculoerosive) disorders, which require periodic and long-term follow-up.

Patient needs have evolved with advances in medical care, offering additional opportunities for Oral Medicine. Several studies have highlighted the increase in medical diagnoses and polypharmacy in the aging population.[26-28] The incidence of oral lesions, salivary disorders, orofacial pain, and oral sensory complaints was also illustrated in the study published by Miller et al. in 2001.[13] Our results, which update the reported findings in 2001, show an increased prevalence of cardiovascular, endocrine, and rheumatologic diseases. It is worth noting that the medical management of patients with these medical comorbidities may lead to oral sequelae (i.e., dry mouth, oral lesions, and mucosal allergic response). The observed association between cardiovascular disease and lichen planus or lichenoid lesions in our sample may reflect medication-induced responses.[29,30] The association between psychiatric diagnosis and glossodynia or burning mouth may reflect the great impact of this disease on the patient's health quality of life and coping strategies or the underlying biologic mechanisms.[31,32]

Results from different populations and geographic sites across the globe confirm the demand for Oral Medicine care. The only major difference between our results and other Oral Medicine surveys are the high number of oncology-related diagnosis (ranked number 6) in our survey, which possibly stems from a major number of respondents who provide care in oncology settings.

CONCLUSIONS

The results of the present study provide a current view of the practice of Oral Medicine in the United States, in the context of previous studies done in our field and specialty memberships in North American and international settings.[33-35] Oral Medicine remains a referral-

based discipline practiced mostly in medical center or dental school settings in the United States. Patients usually have seen at least two health providers before consulting an Oral Medicine clinician and have experienced their complaint for more than 1 year, and an increase in medical comorbidities is also seen. Mucosal disorders, facial pain, and dry mouth or salivary hypofunction were the most frequently encountered patient complaints in this survey. Limitations of this survey include its cross-sectional nature, partial self-reported nature of some subject information (i.e., medical comorbidities), a low return rate, and a moderate amount of missing individual patient data. However, despite these limitations, these data support the premise that Oral Medicine continues to be a growing field of dental practice in the United States and represents a viable venue for referral from diverse health care practitioners and an exciting opportunity for interprofessional collaboration, research, teaching, and patient care.

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