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ORIGINAL ARTICLE

Facilitators and barriers to referral compliance among dental patients with increased risk of obstructive sleep apnea

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ABSTRACT

Objective: Our aims were to determine the adherence rate to dentist referrals for sleep apnea evaluation and the barriers and facilitators to referral compliance.

Material and methods: A sample of 1099 patients was screened with the STOP-Bang questionnaire. Those with elevated risk were referred for a sleep evaluation. An interview was conducted over the phone to determine compliance to referral and the barriers and facilitators to compliance.

Results: Of the 1099 patients (mean age: 45.1 ± 10 years) screened, 224 (20.4%) patients were determined to be at-risk for obstructive sleep apnea (OSA). Only 41 (18.3%) patients with increased risk adhered to referral recommendation. Demographic and health characteristics did not show significant differences between the compliant and non-compliant patients. The most common facilitators to compliance were increased awareness about OSA ($N = 25$, 65%) and dentist recommendation ($N = 14$, 34.1%), whereas the most common barriers to referral compliance were misconceptions about OSA ($N = 69$, 37.7%) and work responsibilities ($N = 44$, 24%).

Conclusions: Only a small percentage of patients adhered to the recommendation of their dentist to see a sleep specialist. Increased awareness about OSA and dentist recommendation were the most common factors that facilitated compliance, whereas misconceptions about OSA and work responsibilities were the most common barriers to patient compliance.

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Introduction

Obstructive sleep apnea (OSA) is a common sleep-related breathing disorder with increasing prevalence rates [1]. Untreated OSA is a risk factor for cardiovascular disorders, neurocognitive sequelae and mood disorders [2]. Once diagnosed, it can be treated with continuous positive airway pressure (CPAP) therapy, oral appliances, various surgeries and/or adjunctive measures such as weight loss [3].

Even with the increasing awareness among the public and health professionals, OSA still remains significantly underdiagnosed [4]. American Academy of Sleep Medicine (AASM) task force released quality measures aimed at optimizing care for adult patients with OSA, one of which is to improve disease detection [5]. The 'gold standard' for establishing the diagnosis of OSA is an overnight polysomnography. However, laboratory polysomnography is not always available to patients due to high costs and the discrepancy between demand and capacity [6]. In order to aid healthcare providers in determining at-risk patients who would benefit from further assessment, several OSA screening tools have been developed [7]. One of these screening tools, the STOP-Bang questionnaire, has been shown to have high methodological quality [8]. It includes eight dichotomous questions related to sleep apnea (snoring, tiredness, observed apnea, high blood pressure, BMI, age, neck circumference and male gender). Three or more items of positive results are considered as 'at-risk' for OSA. The form can be completed in one or two minutes, which makes it is easy-to-use in busy clinics [8].

Medical screening in a dental setting could lead to earlier recognition of patients at-risk for various medical conditions and referral of the patient for further evaluation if needed [9]. Recent studies suggest that patients are willing to participate in medical screening in a dental setting and dentists are willing to incorporate medical screening tests into their practice [10,11]. Considering that most patients visit their dentist on a routine basis, the dental office provides an ideal opportunity in early disease detection and referral of patients for further evaluation [10,12].

Dentists already play an important role in the treatment of sleep apnea providing oral appliance therapy and orthognathic surgical treatment in adults, as well as growth modification therapies in pediatric patients. They also have a role and responsibility in recognition and the proper referral of patients with OSA [13]. However, there is a paucity of studies addressing the outcomes of screening of patients for OSA in dental settings.

So far, the research has tended to focus on the incidence of sleep disorders in dental patients, rather than on patients' attitudes towards dentist recommendations for sleep apnea evaluation [14,15]. Even if dentists could recognize symptoms of sleep apnea, diagnostic rates might not necessarily

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increase if the patients are not compliant with recommendations for further evaluation. Therefore, our aims in this study were to ascertain the adherence rate to dentist referrals for sleep apnea evaluation and to determine the barriers and facilitators to referral compliance in a university-based sample of dental patients.

Material and methods

After obtaining the institutional ethics committee approval, a convenience sample of consecutive patients who presented for a dental evaluation in a tertiary clinic was recruited. Eligibility criteria included patients 18 years and older, and with no history of previous diagnosis of or treatment for OSA. Exclusion criteria included lack of consent to participate in the study, inability to understand or complete the questionnaires, prior OSA diagnosis or treatment and advanced diseases that could compromise one's ability to participate in the study.

Following informed consent, each participant was asked to complete the STOP-Bang questionnaire. Demographic (age, gender and educational level) and anthropometric (neck circumference, height, body weight and body mass index) data as well as any currently known comorbidities were recorded. The dental examination was completed as usual and STOP-Bang score was calculated. Patients who answered positive to three or more items were classified as 'at-risk' and they were informed of their elevated risk for OSA based on the questionnaire. All the patients who were determined to be 'at-risk' were given information about the questionnaire, and what an elevated risk means by one of the researchers (BSA). They were also given brief information about the symptoms, polysomnographic evaluation, consequences and treatment of OSA by the same researcher (BSA). The patients were informed that National Health Insurance covers the costs of polysomnography, but there is a co-payment for the test if it is performed at the university. All of the 'at-risk' patients were then referred for a formal sleep evaluation with an official referral form.

The referred patients were contacted over the phone, two months after the dental visit to determine if they have scheduled an appointment with a sleep specialist. Patients who have not performed so were qualified as 'non-compliant'. An interview was conducted over the phone to determine the barriers and facilitators to compliance with referral. Two open-ended survey questions were asked during this interview to identify the key themes regarding patients' experiences of the referral process. Potential barriers were determined through the question, 'What made you decide not to schedule an appointment with a sleep specialist for further evaluation for sleep apnea?'. Facilitating factors were determined through the question, 'What made you decide to schedule an appointment with a sleep specialist for further evaluation for sleep apnea?'. Patients' responses to these survey questions were recorded on a data sheet verbatim.

Statistical analysis

Quantitative analyses were performed using SPSS Statistics for Windows version 21.0 software (IBM Corp., Armonk, NY). Demographic and clinical data were analyzed using descriptive statistics. Continuous variables were compared between the groups using independent samples *t*-test. Categorical variables were compared between the groups using Pearson's chi-square or Fisher's exact test where appropriate. Statistical significance was defined as $p \leq .05$ (two-tailed).

Qualitative analysis was performed by the researchers without using computer software. The answers to the open-ended questions were subjected to conventional content analysis [16]. Two categories were used to develop the coding scheme (facilitators and barriers). All answers were read several times by the researcher who conducted the interviews (BSA) to obtain an overall impression of the data, and common themes were identified. These initial themes were then reviewed and discussed by the three authors and the analysis was revised until all researchers agreed on the themes.

Results

A total of 1168 patients were initially invited to take part in the study. Of these patients, 24 (2.1%) patients did not meet the inclusion criteria, 19 (1.6%) patients declined to participate and 26 (2.2%) patients were excluded due to missing data, leaving 1099 (94.1%) patients enrolled in the study. Out of the 1099 patients (690 female, 62.8%) screened, 224 (20.4%) patients were determined to be at-risk for OSA, thereby warranting physician referral.

Quantitative

Demographic and health characteristics of the patients are presented in Table 1. The mean age of the sample was 45.1 ± 10 years, with the range of ages varying from 18 to 82 years. Less than half of the patients (41.8%) had an educational level of high school or higher. No significant differences in educational level existed between low-risk and at-risk subjects. Significantly more men than women were screened as at-risk patients. At-risk subjects were also heavier (BMI: 31.0 ± 5.4 vs. 27.4 ± 4.1, $p \leq .05$), older (age: 49.8 ± 11.7 vs. 43.9 ± 9.1, $p \leq .05$) and had a larger neck circumference (neck circumference: 39.8 ± 5.1 vs. 35.0 ± 3.0, $p \leq .05$). There were significantly more patients with reported high blood pressure, diabetes and heart disease in the at-risk group. The prevalence of stroke did not show significant differences between the groups.

Of the patients referred for a sleep evaluation, 41 (18.3%) patients adhered to recommendations by their dentist, whereas 183 (81.7%) patients took no action to schedule an appointment with a sleep specialist. Demographic and health characteristics did not show significant differences between the compliant and non-compliant patients (Table 2).

Qualitative

Facilitators and barriers to referral compliance are shown in Table 3.

Table 1. Demographic and anthropometric characteristics of the patients.

Characteristic	All subjects ($N = 1099$)	Low-risk subjects ($N = 875$)	At-risk subjects ($N = 224$)	p Value*
Mean ± SD (min–max)				
Age (years)	45.1 ± 10.0 (18–82)	43.9 ± 9.1 (18–72)	49.8 ± 11.7 (18–82)	<.001**
STOP-Bang score	1.9 ± 1.6 (0–8)	1.3 ± 0.8 (0–2)	4.5 ± 1.2 (3–8)	<.001**
Neck circumference (cm)	36.0 ± 4.1 (25–52)	35.0 ± 3.0 (25–47)	39.8 ± 5.1 (28–52)	<.001**
BMI	28.1 ± 4.6 (16.3–58.3)	27.4 ± 4.1 (16.3–39.2)	31.0 ± 5.4 (18.2–58.3)	<.001**
Number (%)				
High school graduate or higher	459 (41.8)	370 (42.2)	89 (39.7)	.489
Female	690 (62.8)	601 (68.7)	89 (39.7)	<.001**
High blood pressure	153 (13.9)	82 (9.4)	71 (31.7)	<.001**
Diabetes	134 (12.2)	97 (11.1)	37 (16.5)	.027**
Heart disease	39 (3.5)	26 (3.0)	13 (5.8)	.041**
Stroke	7 (0.6)	6 (0.7)	1 (0.4)	.566

SD: standard deviation; min: minimum; max: maximum.
*Comparative statistics (low-risk vs. at-risk) and respective p values were obtained using Pearson's chi-square or Fisher's exact test for categorical variables and independent samples t-test for continuous variables. Statistical significance was defined as $p \leq .05$ (two-tailed).
**Statistically significant.

Table 2. Demographic and health characteristics of the patients, according to compliance status.

Characteristic	Non compliant ($N = 183$)	Compliant ($N = 41$)	p Value*
Mean ± SD (min–max)			
Age (years)	50.1 ± 11.7 (18–82)	47.9 ± 11.4 (18–75)	.273
STOP-Bang score	4.5 ± 1.2 (3–8)	4.2 ± 1.2 (3–7)	.134
Neck circumference (cm)	39.9 ± 5.1 (28–51)	39.3 ± 5.1 (30–52)	.484
BMI	30.8 ± 5.1 (18.2–51.4)	31.6 ± 6.3 (22–58.3)	.378
Number (%)			
Age (stratified)			
<25 years	8 (4.4)	1 (2.4)	.626
25–34 years	10 (5.5)	3 (7.3)	
35–44 years	34 (18.6)	10 (24.4)	
45–54 years	56 (30.6)	16 (39)	
55–64 years	59 (32.2)	9 (21.9)	
≥65 years	16 (8.7)	2 (5)	
High school graduate or higher	72 (39.3)	17 (41.4)	.801
Female	68 (37.2)	21 (51.2)	.096
High blood pressure	58 (31.7)	13 (31.7)	.999
Diabetes	28 (15.3)	9 (22.0)	.300
Heart disease	13 (7.1)	0 (0)	.067
Stroke	1 (0.5)	0 (0)	.817

SD: standard deviation; min: minimum; max: maximum.
*Comparative statistics (non-compliant vs. compliant) and respective p values were obtained using Pearson's chi-square or Fisher's exact test for categorical variables and independent samples t-test for continuous variables. Statistical significance was defined as $p \leq .05$ (two-tailed).

Facilitators

The responses of 41 compliant patients to the question 'What made you decide to schedule an appointment with a sleep specialist for further evaluation for sleep apnea?' yielded a total of 52 statements that were organized under four categories during content analysis. Major themes that facilitated compliance among at-risk patients included increased awareness about OSA ($N = 25$, 65%), dentist recommendation ($N = 14$, 34.1%), positive view of services ($N = 7$, 17.1%) and family support ($N = 6$, 14.6%).

The most commonly cited facilitator among the compliant patients was an increase in their awareness about OSA. Being given information about OSA assisted the patients in making an informed decision about their care:

> I didn't know snoring could indicate something else. I always thought that it was a natural part of growing old.

Another common facilitator reported by the patients was dentist recommendation. The decision to make an appointment for a formal sleep evaluation was made easier by the notion that it was recommended by an 'expert'.

Table 3. Self-reported facilitators and barriers associated with compliance.

Major themes	Frequency of theme[a]
Facilitators	
Increased awareness about OSA	$N = 25$ (65%)
Dentist recommendation	$N = 14$ (34.1%)
Positive view of services	$N = 7$ (17.1%)
Family support	$N = 6$ (14.6%)
Barriers	
Misconceptions about OSA	$N = 69$ (37.7%)
Work responsibilities	$N = 44$ (24%)
Negative views of services	$N = 17$ (9.3%)
Financial barriers	$N = 15$ (8.2%)
Transportation difficulties	$N = 13$ (7.1%)
Family demands	$N = 11$ (6%)
Lack of support from family	$N = 10$ (5.5%)
Presence of other medical/physical illness	$N = 9$ (4.9%)
Anxiety about the polysomnography	$N = 5$ (2.7%)

[a]In some cases, patients cited more than one facilitator or barrier.

Some of the patients perceived having a positive view of services as being important in helping them decide:

> I was afraid that it would be hard to get an appointment. However the doctors were very nice. They examined me the same day, and I was able to get a date for the sleep study.

Finally, patients expressed that the support of their family members was important when they were making their decision to see a sleep specialist or not.

Barriers

Barriers to referral compliance included misconceptions about OSA ($N = 69$, 37.7%), work responsibilities ($N = 44$, 24%), negative views of services ($N = 17$, 9.3%), financial barriers ($N = 15$, 8.2%), transportation difficulties ($N = 13$, 7.1%), family demands ($N = 11$, 6%), lack of support from family ($N = 10$, 5.5%), presence of other medical/physical illness ($N = 9$, 4.9%) and anxiety about the polysomnography ($N = 5$, 2.7%).

The most common barrier to referral compliance was the patients' misconceptions about OSA. Despite being given information about OSA and receiving a recommendation for further sleep evaluation, some patients believed that a referral to the physician was not indicated for them:

> I just snore. I don't need a test to tell me that. My father also snored. He is fine. Snoring is part of growing old.

Another major barrier was the patients' perceptions regarding the difficulty in scheduling an appointment due to work responsibilities. Some patients expressed dissatisfaction with the services they received either during their dental appointments or when they went to the Department of Otorhinolaryngology for their sleep evaluation. Financial reasons were another barrier to referral compliance. Some patients were unable to pay for the test, whereas others didn't want to pay for the test. Transportation difficulties, such as lack of access to a vehicle or long distance to the clinic, were reported as another barrier to scheduling an appointment. Family responsibilities made it hard for some patients to seek further evaluation of their sleep, especially if they were caretakers of elderly parents or small children.

Lack of familial support was also a barrier to referral compliance. Family members' attitudes towards the disease and the appointment process influenced patients' decision to follow-up on the referral:

> I can't come to the hospital on my own and my husband says he doesn't have the time to take me there. He thinks it is unnecessary and that I am fine.

The presence of other illnesses made it harder to make an appointment for some patients and some participants did not want to make an appointment because of anxiety about the procedure.

When stratified by age, barriers and facilitators did not show significant difference between age groups ($p > .05$).

Discussion

To increase diagnostic rates in OSA, efforts by health professionals are required to determine at-risk patients and refer them to a sleep medicine specialist. To our knowledge, this study is the first to determine the barriers and facilitators to referral compliance in patients with suspected OSA in a dental setting.

According to STOP-Bang scores, the prevalence of patients at-risk was found to be 20.4% in our study. Dillow et al. [17] found that 18.5% of dental patients were screened as at-risk for OSA with the STOP-Bang questionnaire. However, using the Apnea Risk Evaluation System (ARES^{TM}), Levendowski et al. [15] reported that 40% of their patients were predicted to be at-risk for moderate to severe OSA. The lower prevalence in our study may be explained by the higher number of females and the lower mean age of the patients, given that the risk of OSA increases with age and men are at higher risk than women [18]. Moreover, depending on which screening tool is used, the percent identified as being at-risk for OSA varies considerably [19], and unless the diagnosis is confirmed with polysomnography, the prevalence of people at-risk for OSA cannot be converted into the prevalence of OSA.

Obstructive sleep apnea has been implicated in the etiology of hypertension, coronary artery disease, congestive heart failure and stroke as well as diabetes [20,21]. Previous studies have shown that male gender, increased age and obesity are risk factors in OSA [18,22–24]. At-risk patients in our study were also predominantly male, older, had a larger neck circumference and were heavier; with their average BMI in the obese range according to the World Health Organization (WHO) guidelines. The percentage of self-reported high blood pressure, diabetes and heart disease was also higher in this group. These results show that dentists could provide a valuable service to their patients by incorporating OSA screening into their practice, considering the serious adverse health and quality-of-life consequences.

Studies show compliance rates of 63–87% when specialist evaluation is suggested by primary care physicians [25,26]. Studies on dental patients, however, report more conflicting results. Genco et al. [27] screened dental patients for diabetes and found that only 22% of those in private dental offices seeked a diagnostic work-up from their physicians, whereas 79% of patients from the community health centre sought a medical diagnosis. Dillow et al. [17] reported that half of the dental patients who screen at-risk for OSA adhered to a recommendation to seek physician evaluation. In our study, non-adherence was high, with only 18% of the patients following-up on referral. Access to health care, cultural beliefs, education about chronic disease and the nature of patient–-physician interactions may vary between countries [28] which could have been a contributing factor to the low compliance rate in our study.

Although no single risk factor has been identified in this study to contribute to poor compliance, our qualitative analysis showed that there were a variety of barriers to seeking further evaluation. In line with findings by Shaw et al. [29], misconception about the disease was the largest barrier in OSA evaluation. Many patients believed that their symptoms were normal signs of aging. Work responsibilities, negative views of services, financial barriers, transportation difficulties, family demands, lack of support from family, presence of comorbidities and anxiety about the polysomnography were the other factors which contributed to the participants' reluctance to seek diagnosis. Our results corroborate previous studies showing that a wide range of issues, ranging from

individual beliefs and attitudes to functional and familial concerns, are associated with decreased patient compliance in symptom assessment and treatment [29,30]. Patients also identified several facilitators that should be taken into account during OSA screening and referral. Many patients in our study reported that they were motivated by the dentist explaining them about the health consequences of untreated OSA. Positive view of services and family support were also important factors in their decision to undergo further evaluation. Our results suggest that providing specific information about OSA, including the family members in the discussion, when possible, and increasing the ease of seeking an appointment for the initial evaluation by the physician may increase chances of referral compliance.

There are some limitations to this study. First, only full overnight polysomnography was offered to the patients for OSA diagnosis. Although polysomnography is still the 'gold standard' in definitive sleep apnea diagnosis, out-of-center sleep testing (OCST) is currently recommended for the diagnosis of OSA in uncomplicated adult patients presenting with signs and symptoms that indicate an increased risk of moderate to severe OSA [31]. Since OCST is easily accessible and more convenient for patients, it is possible that the patients who were intimidated by an in-laboratory test may have been more willing to consider OCST and followed up on our referral if it was offered as an option. Second, although a large population of adults was evaluated in our study, the use of a convenience sample limits the generalizability of our findings. Similar results may not apply in other dental settings. Third, as with other interview-based studies, there may be social desirability response bias if the patients felt a pressure to give socially acceptable answers. We tried to minimize the response bias by assuring the patients that their responses would remain anonymous. Finally, while this study showed low compliance rates in the short-term period, more research is needed to determine the impact of the referral process on health care seeking behaviour over an extended period of time. The two-month period for scheduling an appointment may have overestimated poor compliance to referral.

Conclusions

Our study has sought to gain a better understanding of the participatory role preference of patients in OSA diagnosis when referred to a sleep specialist by their dentist. Approximately 20% of the patients were classified as at-risk for OSA, but only a small percentage of these patients adhered to the recommendation of their dentist to see a sleep specialist. The high number of patients choosing not to make an appointment indicates that incorporating sleep apnea screening to dental practice will not be enough to aid in the early diagnosis of OSA unless the referral process addresses the barriers which have an influence on adherence. Additionally, incorporating advanced educational interventions to increase awareness and knowledge about OSA to the screening and referral process may be helpful in increasing the adherence rates. Aiming for higher compliance to referral should be a long-term target in the management of patients with suspected OSA in dental practice.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

[1] Peppard PE, Young T, Barnet JH, et al. Increased prevalence of sleep-disordered breathing in adults. Am J Epidemiol. 2013;177:1006–1014.
[2] Mannarino MR, Di Filippo F, Pirro M. Obstructive sleep apnea syndrome. Eur J Intern Med. 2012;23:586–593.
[3] Jordan AS, McSharry DG, Malhotra A. Adult obstructive sleep apnoea. Lancet. 2014;383:736–747.
[4] Gibson GJ. Obstructive sleep apnoea syndrome: underestimated and undertreated. Br Med Bull. 2005;72:49–65.
[5] Aurora RN, Collop NA, Jacobowitz O, et al. Quality measures for the care of adult patients with obstructive sleep apnea. J Clin Sleep Med. 2015;11:357–383.
[6] Flemons WW, Douglas NJ, Kuna ST, et al. Access to diagnosis and treatment of patients with suspected sleep apnea. Am J Respir Crit Care Med. 2004;169:668–672.
[7] Miller JN, Berger AM. Screening and assessment for obstructive sleep apnea in primary care. Sleep Med Rev. 2016;29:41–51.
[8] Chung F, Yegneswaran B, Liao P, et al. STOP questionnaire: a tool to screen patients for obstructive sleep apnea. Anesthesiology. 2008;108:812–821.
[9] Miller CS, Westgate PM. Implications of medical screenings of patients arriving for dental treatment: the results of a comprehensive laboratory screening. J Am Dent Assoc. 2014;145:1027–1035.
[10] Greenberg BL, Kantor ML, Jiang SS, et al. Patients' attitudes toward screening for medical conditions in a dental setting. J Public Health Dent. 2012;72:28–35.
[11] Greenberg BL, Glick M, Frantsve-Hawley J, et al. Dentists' attitudes toward chairside screening for medical conditions. J Am Dent Assoc. 2010;141:52–62.
[12] Strauss SM, Alfano MC, Shelley D, et al. Identifying unadressed systemic health conditions at dental visits: patients who visited dental practices but not general health care providers in 2008. Am J Public Health. 2012;102:253–255.
[13] Gauthier L, Almeida F, Arcache JP, et al. Position paper by Canadian dental sleep medicine professionals on the role of different health care professionals in managing obstructive sleep apnea and snoring with oral appliances. Can Respir J. 2012;19:307–309.
[14] Ivanoff CS, Pancratz F. Incidence of sleep disorders reported by patients at UTHSC College of Dentistry: a two-year follow-up and proposed educational program. J Dent Educ. 2015;79:548–556.
[15] Levendowski DJ, Morgan T, Montague J, et al. Prevalence of probable obstructive sleep apnea risk and severity in a population of dental patients. Sleep Breath. 2008;12:303–309.
[16] Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15:1277–1288.
[17] Dillow K, Essick G, Sanders A, et al. Patient response to sleep apnea screening in a dental practice. J Public Health Dent. 2016;77:13–20.
[18] Hiestand DM, Britz P, Goldman M, et al. Prevalence of symptoms and risk of sleep apnea in the US population: results from the national sleep foundation sleep in America 2005 poll. Chest. 2006;130:780–786.
[19] Lockhart EM, Willingham MD, Abdallah AB, et al. Obstructive sleep apnea screening and postoperative mortality in a large surgical cohort. Sleep Med. 2013;14:407–415.

[20] Punjabi NM. The epidemiology of adult obstructive sleep apnea. Proc Am Thorac Soc. 2008;5:136–143.
[21] Reichmuth KJ, Austin D, Skatrud JB, et al. Association of sleep apnea and type II diabetes: a population-based study. Am J Respir Crit Care Med. 2005;172:1590–1595.
[22] Young T, Palta M, Dempsey J, et al. The occurrence of sleep-disordered breathing among middle-aged adults. N Engl J Med. 1993;328:1230–1235.
[23] Bixler EO, Vgontzas AN, Ten Have T, et al. Effects of age on sleep apnea in men: I. Prevalence and severity. Am J Respir Crit Care Med. 1998;157:144–148.
[24] Bixler EO, Vgontzas AN, Lin HM, et al. Prevalence of sleep-disordered breathing in women: effects of gender. Am J Respir Crit Care Med. 2001;163:608–613.
[25] Forrest CB, Shadmi E, Nutting PA, et al. Specialty referral completion among primary care patients: results from the ASPN referral study. Ann Fam Med. 2007;5:361–367.
[26] van Dijk CE, de Jong JD, Verheij RA, et al. Compliance with referrals to medical specialist care: patient and general practice determinants: a cross-sectional study. BMC Fam Pract. 2016;17:11.
[27] Genco RJ, Schifferle RE, Dunford RG, et al. Screening for diabetes mellitus in dental practices: a field trial. J Am Dent Assoc. 2014;145:57–64.
[28] Bowry ADK, Shrank WH, Lee JL, et al. A systematic review of adherence to cardiovascular medications in resource-limited settings. J Gen Intern Med. 2011;26:1479–1491.
[29] Shaw R, McKenzie S, Taylor T, et al. Beliefs and attitudes toward obstructive sleep apnea evaluation and treatment among blacks. J Natl Med Assoc. 2012;104:510–519.
[30] Cohen E, Botti M. Cancer patients' perceptions of the barriers and facilitators to patient participation in symptom management during an episode of admission. Cancer Nurs. 2015;38:458–465.
[31] Kapur VK, Auckley DH, Chowdhuri S, et al. Clinical practice guideline for diagnostic testing for adult obstructive sleep apnea: an American Academy of Sleep Medicine clinical practice guideline. J Clin Sleep Med. 2017;13:479–504.