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An evaluation of the opinions and knowledge on obstructive sleep apnea at the Fort Bragg DENTAC

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Abstract

The American Academy of Sleep Medicine (AASM) classifies OSA as having an apnea-hypopnea index of five or greater per hour and strongly recommends the use of polysomnography or home sleep apnea testing for its diagnosis. Oral appliances can be fabricated by dentists to help treat obstructive sleep apnea (OSA) when prescribed by a boarded sleep medicine physician. This study seeks to find if dental providers, trained to help treat OSA, are confident in their education and capable of understanding fundamental aspects of OSA. A survey was conducted of Fort Bragg DENTAC providers and analyzed using various statistical analyses. Forty-three individuals completed the survey, and OSA experienced providers expressed doubt in their training. In general, there was no significant difference between OSA trained and untrained providers regarding baseline dental sleep medicine knowledge.

Introduction

Sleep apnea is a disease that may affect any population regardless of age, gender, or ethnicity and is defined by periodic apneas or hypopneas.¹⁻³ Obstructive sleep apnea occurs when soft tissues of the upper airway collapse intermittently during sleep thus blocking the airway and resulting in arousals, fragmented sleep, and disturbance in the normal sleep structure.² In the Wisconsin Cohort Study, OSA was prevalent in 9-24% of men and 4-9% of women aged 30 to 60 years old.³ It is estimated that upwards of 82% of men and 93% of women with moderate to severe OSA have not been diagnosed.⁴

The American Academy of Sleep Medicine (AASM) classifies OSA as having an apnea-hypopnea index of five or greater per hour and strongly recommends the use of polysomnography or home sleep apnea testing for its diagnosis.⁵ Obtaining a diagnosis of OSA usually arises as a part of routine health maintenance evaluations but may also occur while evaluating symptoms of OSA or as part of a comprehensive exam in high risk individuals.¹ High risk OSA individuals are associated with the following comorbidities: hypertension, obesity, depression, gastroesophageal reflux disease, diabetes mellitus, stroke, coronary heart disease, heart failure, and cardiac arrhythmias.^{1, 6-8}

In the last couple decades, OSA awareness has become much more prevalent with celebrity doctors and mainstream media covering new advances in treatment. The most common treatment modalities for OSA are positive airway pressure (PAP) and oral appliances. PAP continues to change with models that offer continuous (CPAP), bilevel (BPAP), and autotitrating (APAP) modes. CPAP is the initial treatment option for OSA, but its compliance has been a major concern since many individuals are unable to sleep while wearing the differing pressure delivery options.⁹ Oral appliances have been designated a secondary treatment modality for mild to moderate OSA.¹⁰ With the field of dental sleep medicine becoming more widespread, dentists are at a distinct advantage to gather findings of dental specific signs related to OSA in the hopes of facilitating future diagnoses for unwitting individuals.

Although the field of dental sleep medicine is relatively young, some promising studies have been published linking both oral causes and signs of OSA. Kale et al. sought to differentiate between OSA predictors and signs.¹¹ Their study concluded a large tongue, Mallampati score of 3 or 4, deep palatal vault, and neck circumference >40cm were contributory OSA attributes.¹¹ Other studies, focused on oral signs of OSA, have reported associations with

GERD and erosion, anterior attrition, sleep bruxism, scalloped tongue, and periodontitis.¹²⁻¹⁷

Some studies even attempt to determine the likelihood of OSA by developing questionnaires or using established classification systems.¹⁸⁻²⁰ Considering the expanding field of dental sleep medicine, it is vital to stay up-to-date on current literature.

Objective

To assess Fort Bragg DENTAC dentists' confidence to manage sleep apnea with oral appliance therapy and their baseline knowledge regarding obstructive sleep apnea. It is hypothesized that Fort Bragg DENTAC OSA trained providers will have more confidence and a better understanding of obstructive sleep apnea fundamentals.

Methods

A link to a web-based survey was emailed to active members of the Fort Bragg DENTAC distro list. The email informed members that the survey was for a postgraduate AEGD resident research project and that no personally identifiable information would be requested. Data was collected during May of 2019, and the survey instrument included simple demographic characteristics such as age, gender, length of experience practicing dentistry, and area of concentration (AOC). Additionally, the survey included questions designed to elucidate providers' prior exposure to training in dental sleep medicine as well as knowledge specific to sleep apnea.

Descriptive statistics were used for frequency analyses and where appropriate cross-tabulations were applied. Medians and associated interquartile ranges (IQR) were used to summarize non-normally distributed continuous data. Multiple comparisons were accomplished using the Kruskal-Wallis test. The chi-square test of independence was used for pairwise comparisons. The Spearman correlation was used to assess the potential monotonic relationship

between ordinal variables and a Mann Whitney test examined the relationship between categorical variables and non-normally distributed continuous data. Significance was declared at $P < 0.05$ for all tests. All data were analyzed by using SPSS version 25.0 (SPSS, Chicago, IL).

Results

A total of 44 individuals initiated surveys via the email link. However, only 43 respondents (98%) completed the survey. The sole partially completed survey was excluded from the analyses. The median time to complete the survey was 5:23.

The majority of respondents completing the survey were men ($n=26$; 59.1%) compared with only 34.1% ($n=15$) of respondents identifying as women. Three individuals (6.8%) opted not to disclose gender when asked. Among those respondents who did disclose gender, there were no differences between the proportions of men and women with respect to age ($P=0.22$) or AOC ($P=0.30$). Gender differences did present with respect to experience as women overall reported more years practicing dentistry than the men ($P<0.03$). Respondent characteristics are shown in Table 1.

Overall the sample was evenly split between general dentists (63A) and comprehensive dentists (63B) with each category making up 31.8% ($n=14$) of respondents. Remaining individuals identified as 63A9D ($n=7$; 15.9%) or other dental provider ($n=9$; 20.5%). The majority ($n=25$; 56.8%) of respondents indicated that they had received prior formal training on sleep apnea. There was a significant main effect of AOC on whether or not an individual had prior training, $P < 0.01$. The majority of those identifying as 63A9D or 63B (both 85.7%) endorsed training on sleep apnea. In contrast, only 28.6% of 63As and 33.3% ($n=3$) of other dentists reported prior sleep apnea training.

Overall, 56.8% (n=25) reported some training on sleep apnea. Table 2 shows the sources of sleep apnea training. Residency was the most frequently (n=17; 38.6%) cited source of training. Though it is worth noting that a quarter (n=11) of all respondents indicated that they had received training from multiple sources. Among individuals who endorsed prior sleep apnea education, the majority (n=15; 60%) reported receiving more than 10 hours of training on the subject.

Interestingly, there was no correlation between the number of hours one was trained on sleep apnea and respondents' confidence in the subject, $P=0.14$. When asked about confidence in the sleep training they had received, only 13 providers (52.0%) indicated some degree of confidence. In contrast, 7 respondents (28.0%) were neutral and 5 individuals (20.0%) reported a lack of confidence.

Of those who reported prior sleep apnea training, nearly half (n=12; 48%) indicated that they treat four or fewer patients per day on average. Four respondents (16.0%) indicated that they treat 5 to 6 patients per day; six respondents (24.0%) reported treating an average of 7 to 8 patients per day; and three respondents endorsed seeing more than 8 patients per day on average. No correlation was observed between the self-reported average number of patients treated per day and the number of patients referred for sleep study ($P=0.42$) or number of patients treated with appliance therapy ($P=0.23$). However, there was a 0.53 correlation between the number of patients referred for sleep study and the number of patients treated with appliance therapy, $P<0.01$.

The 19 respondents who did not report prior sleep apnea training were asked if they would be interested in a one-day continuing education course on dental sleep medicine. Of those

19, 68.4% (n=13) indicated a strong desire to attend a one-day course on dental sleep medicine. Two individuals (10.5%) reported some interest and four individuals (19.1%) had no interest or were opposed to a one day course in dental sleep medicine.

Table 3 shows the sleep apnea quiz completed by respondents as well as the results. The median correct response rate was 62.5% (IQR 50.0-75.0). Overall, only 17 respondents (39.5%) scored above a 70% on the sleep apnea knowledge quiz. No significant difference was observed in the number of correct responses between those who had reported prior sleep apnea training and those who did not, $P=0.23$. Similarly, no main effect of gender, AOC, or experience was observed on respondents' knowledge of sleep apnea (all $P > 0.05$).

Discussion

The results of this survey do not support the hypothesis that Fort Bragg OSA trained providers have a high level of confidence and baseline knowledge of OSA. In fact, there was no significant difference between trained and untrained individuals regarding general OSA knowledge. It is interesting to note that nearly every provider selected “daytime drowsiness” as a sign of OSA (Figure 1 and 2), which is one of the only self-reported criteria mentioned across the major OSA questionnaires.²¹ When comparing studies using questionnaires and classification systems to screen for OSA patients, it is important to remember the AASM only recommends polysomnography for the diagnosis of sleep apnea. While it is more cost efficient to attempt to develop a test other than PSG to screen for OSA, the sensitivity and specificity is not high enough to accurately rely on question-based screening tools.²¹

Seventy-nine percent of untrained providers selected “scalloped tongue” as the second most likely oral condition they would associate with OSA (Figure 2), which is one of the most reported signs of sleep apnea.¹⁷ Whereas, trained individuals selected “self-reported bruxism”

and “scalloped tongue” as the second most likely oral condition they would suspect with OSA (Figure 1). It appears trained providers rely more on pre-examination questions than intraoral findings. One study found that nearly 80% of bruxism events are inaudible; meaning even bed partners may not be a reliable subjective source.²² This means self-reported bruxism is likely to be inaccurate even if it is a convenient opinion for providers and scholars.

The OSA questions were meant to be as uncomplicated as possible with most answers originating from the 2009 AASM Adult OSA Task Force¹, yet the average scores were relatively low. Question number three, regarding categorizing OSA using the AHI, was the most missed question; followed by number five, regarding whether severe sleep apnea can be treated with oral appliance therapy (Appendix A). Question number three was meant to ascertain dentists’ basic knowledge of understanding a sleep study. Question number five may have been overtly confusing because sleep medicine doctors may prescribe oral appliances in severe OSA patients when CPAP compliance is poor or when dual therapy is indicated.²³

The major limitation of this study was the small sample size. Most dental specialties were not listed simply because there are not enough at Fort Bragg to make a statistical difference, so they were grouped together under the ‘other’ AOC category. Ultimately, most trained dentists can treat OSA with an oral appliance without obtaining a complete understanding of OSA fundamentals as long as they understand basic principles of occlusion and TMJ anatomy. Dentists should at the very least appreciate that opening a patient’s vertical dimension of occlusion or using sleep bruxism devices that do not advance the mandible may, in fact, worsen the patient’s OSA.¹² In conclusion, AOC, gender, and history of OSA training did not have a significant effect on general OSA knowledge, which may explain why nearly fifty percent of OSA trained providers did not feel confident in their training. While a provider’s confidence did

not have a significant effect on correctly answering the OSA knowledge-based portion of the survey, the more confident providers did score slightly higher.

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Appendix A

1. How is apnea-hypopnea index (AHI) measured?
 - a. An event that causes an arousal or a decrease in oxygen saturation, without qualifying as an apnea or hypopnea.
 - b. It's the average number of combined apneas and hypopneas per hour. It is most often used to determine the severity of a person's sleep apnea.
 - c. This is your combined number of apneas, hypopneas and RERAs per hour of sleep.
 - d. A significant reduction in airflow while sleeping (not a complete stop) that causes a drop in blood oxygen saturation and then an arousal.
2. Obstructive sleep apnea (OSA) is defined as _____.
 - a. A sleep-related disorder in which the effort to breath is diminished or absent.
 - b. A chronic disorder in which your muscles relax during sleep, allowing soft tissue to collapse and block the airway.
 - c. Loud snoring and restless sleep.
3. Moderate OSA is defined as having and AHI of _____.
 - a. <5
 - b. 5-10
 - c. 15-30
 - d. 20-35
4. What is the gold standard to diagnose sleep apnea?
 - a. Polysomnography
 - b. Sleep partner
 - c. Electromyography
 - d. STOP-Bang questionnaire
5. T/F: Only mild and moderate OSA can be treated with an oral sleep appliance.
 - a. True
 - b. False
6. What is the gold standard to treat OSA?
 - a. Sleep hygiene
 - b. UPPP
 - c. PAP
 - d. Oral sleep appliance
7. Please select all of the following conditions in which you might suspect OSA.
 - a. Self-reported bruxism
 - b. Daytime drowsiness
 - c. Scalloped tongue
 - d. Anterior attrition
 - e. Periodontitis

8. T/F: A dentist can diagnose OSA.
 a. True
 b. False

Table 1. Respondent Characteristics¹

	Men		Women		P ²
	n	%	n	%	
Total	26	59.1	15	34.1	<0.001
Age					
25 – 30	5	19.2	3	20.0	
31 – 35	16	61.5	5	33.3	
36 – 40	0	0.0	0	0.0	0.22
41 – 45	2	7.7	3	20.0	
Over 45	3	11.5	4	26.7	
Area of Concentration					
63A	8	30.8	4	26.7	
63A9D	5	19.2	2	13.3	0.30
63B	10	38.5	4	26.7	
Other	3	11.5	5	33.3	
Years practicing dentistry					
1 – 2	9	34.6	1	6.7	
3 – 5	5	19.2	3	20.0	0.03
6 – 10	7	26.9	4	26.7	
>10	5	19.2	7	46.7	

1. Totals do not sum to 44 due to 3 respondents not disclosing gender.

2. Significance based on chi-square test

Table 2. Sleep Apnea Training Source

	n	%
Dental School	9	36.0
Residency	17	68.0
Formal OSA Course	9	36.0
General continuing education	7	28.0
Training from multiple sources	11	44.0

* Based on n=25 individuals reporting prior training

Table 3. Sleep Apnea knowledge quiz

Question	n correct	% correct
1. How is apnea-hypopnea index (AHI) measured?	31	72.1
2. Obstructive sleep apnea (OSA) is defined as _____.	28	65.1
3. Moderate OSA is defined as having an AHI of _____.	20	46.5
4. What is the gold standard to diagnose sleep apnea?	38	88.4
5. T/F: Only mild and moderate OSA can be treated with an oral sleep appliance.	23	53.5
6. What is the gold standard to treat OSA?	35	81.4
7. Please select all of the following oral conditions in which you might suspect OSA.	2	4.7
8. T/F: A dentist can diagnose OSA.	39	90.7

Figure 1 – OSA Trained Providers’ Response for Suspected Oral Conditions Associated with OSA

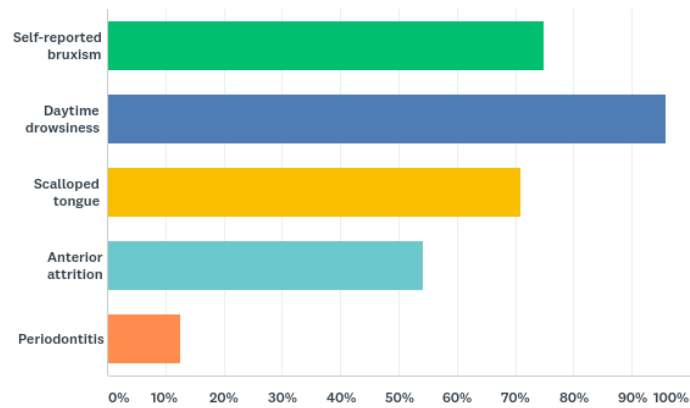


Figure 2 – Untrained Providers’ Responses for Suspected Oral Conditions Associated with OSA

