



Ontario Dentist

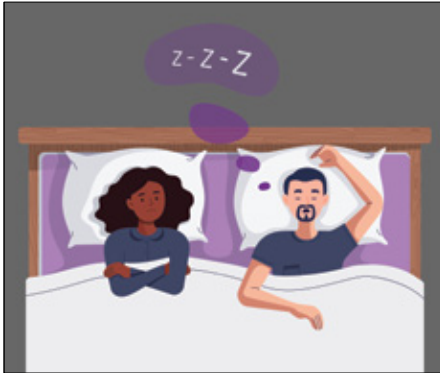
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Sleep Apnea: Is Dentistry Doing Enough?

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John Viviano
DDS D ABDSM

Sleep Apnea: Is Dentistry Doing Enough?

Sleep apnea affects almost one-billion people worldwide, leaving those afflicted feeling tired, accident prone, moody, depressed and susceptible to a host of significant medical concerns, often culminating in a shortened lifespan (1). Particularly noteworthy during the COVID-19 pandemic is that unmanaged sleep apnea is associated with increased hospitalization from influenza infection (2). The alarming fact that more than 85 per cent of those afflicted with sleep apnea remain undiagnosed (1) begs the question: Is dentistry doing enough?

What is sleep apnea and how is it managed?

Sleep apnea involves disturbed breathing during sleep and is part of a spectrum of breathing issues, the most benign being simple snoring caused by soft tissue vibration, followed by the narrowing of the airway leading to strained breathing, and finally to intermittent full collapse of the airway preventing breathing altogether. The gold standard therapy for sleep apnea is continuous positive airway pressure (CPAP), where a mask interface is used to splint the upper airway open through the use of pressurized air (3). Another conservative option is oral appliance therapy (OAT), which involves the use of an oral appliance to reposition the jaw and prevent it from dropping back during sleep, resulting in a more patent airway. It is not as effective as CPAP in eliminating all of the breathing events, but is much better tolerated by patients, and demonstrates a higher adherence rate than CPAP (4).

How well is sleep apnea being managed?

The American Academy of Sleep Medicine (AASM) documents sleep apnea as a disease with remarkable medical, social and economic impacts. A 22-country market research study conducted by SomnoMed, a leading

oral-appliance manufacturer, documented approximately 2.5-million sleep studies performed during the 2020 fiscal year (estimated to be down by 0.5-million due to COVID-19). These studies resulted in approximately 1.9-million patients proceeding with therapy: 1.35-million with CPAP, 350,000 with OAT, and 200,000 with lifestyle changes, various surgery, etc. Of those trying CPAP, approximately 700,000 or 52 per cent dropped off. Of those trying OAT, approximately 28,000 or eight per cent dropped off. It is very notable that of the 700,000 patients who dropped off CPAP, most remained unmanaged. A Frost & Sullivan report commissioned by the AASM in 2016 corroborates the SomnoMed report documenting that approximately 40 per cent of patients diagnosed with sleep apnea drop out of therapy and remain unmanaged (5). In fact, poor CPAP adherence is well established in the literature, with a recent comprehensive, systematic review involving 82 papers finding that, “CPAP adherence remains persistently low over 20 years’ worth of reported data” (6). Notwithstanding these statistics, there is a very prevalent bias regarding the use of CPAP to manage sleep apnea — it is prescribed approximately 85 per cent of the time (7).

In general, physicians are accustomed to patients not complying with prescriptions; the National Association of Chain Drug Stores documents that only 25 to 30 per cent of patients actually fill and take medications as prescribed (8). So it may be that from a physician’s perspective, medicine is doing a good job by providing a service that demonstrates approximately 60 per cent adherence. In this regard, even when one considers that only about half of patients are wearing their CPAP all night long, leaving the other half suboptimally treated, CPAP adherence is still fairly similar to other prescribed medical treatments.

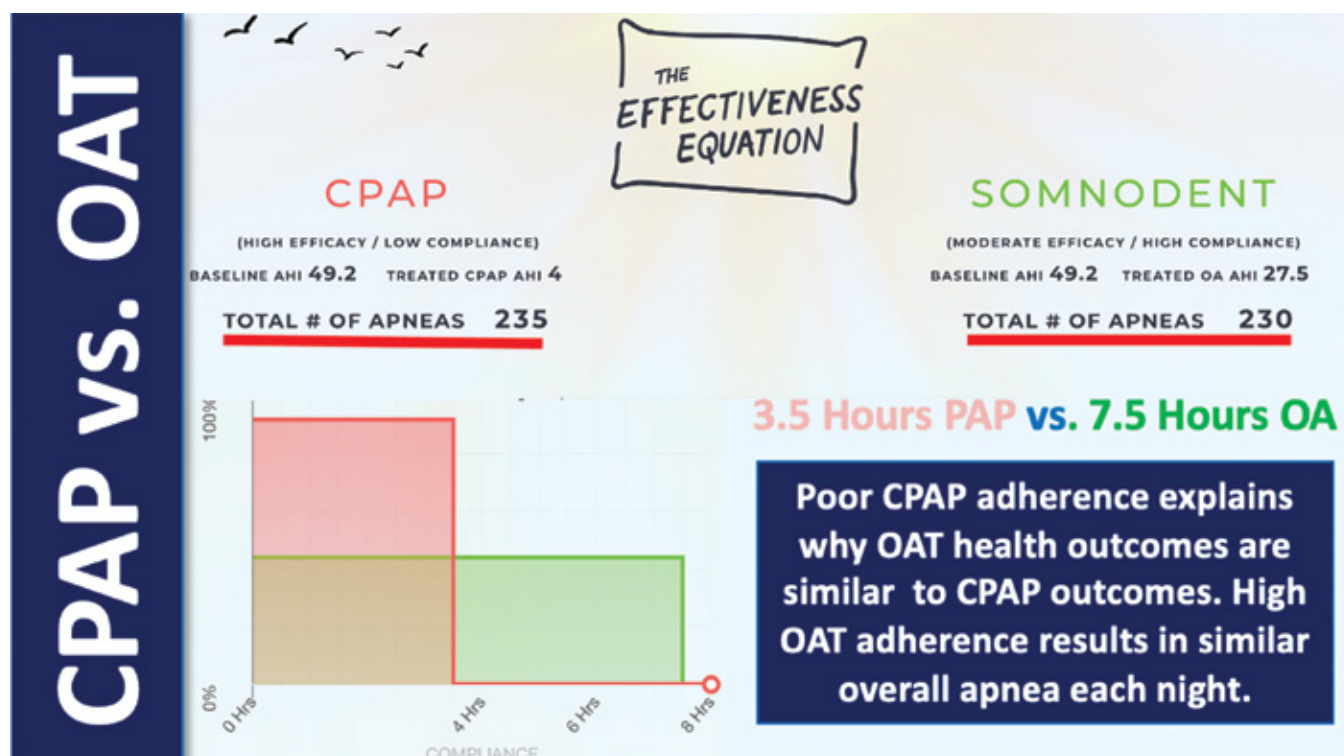


Figure 1. The SomnoMed Effectiveness Equation (SomnoMed, Plano, TX) demonstrates a similar number of apneic events throughout the night even with residual unresolved apnea with OAT. Poor CPAP compliance is thought to be the explanation for similar health outcomes when comparing CPAP and OAT.

So, how one answers the question “How well is sleep apnea being managed?” depends on your point of view. From a physician’s perspective, about two-thirds of patients are being fully managed or at least partially managed. However, from a dental perspective, it can be said that about two-thirds of patients are being suboptimally managed or unmanaged.

CPAP versus OAT: An evidence-based comparison

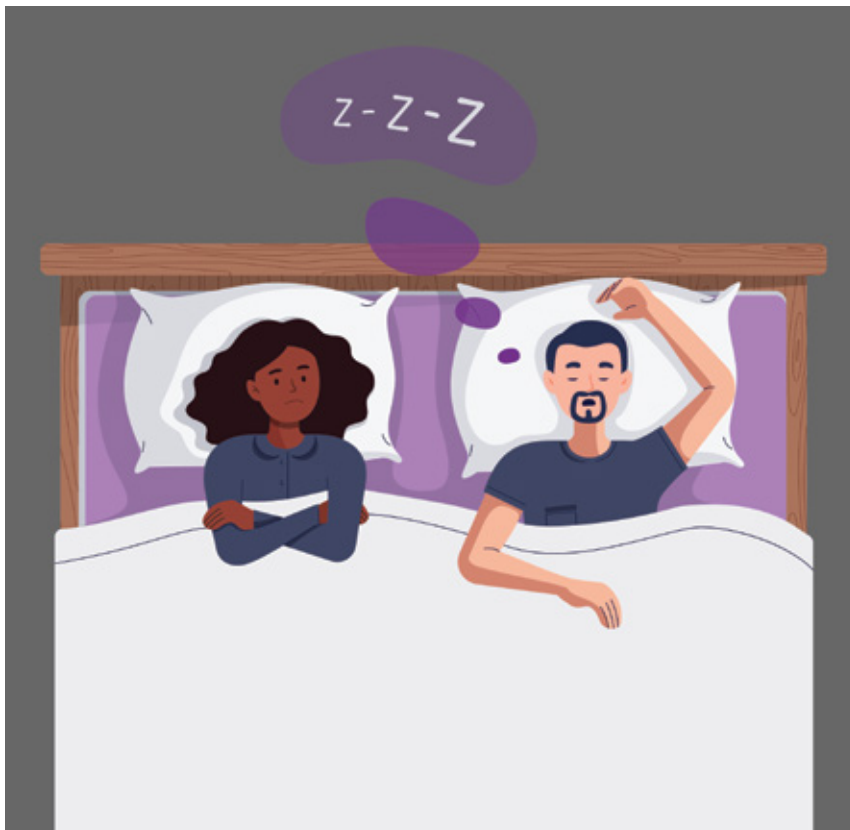
Without question, CPAP is not only very effective in eliminating sleep apnea, but it is also superior to OAT regarding consistent elimination of the issue (9). However, only about a third of patients comfortably adapt to wearing their CPAP all night long, the next third wear their CPAP only part of the night, and the final third are not able to wear CPAP at all. The literature documents that CPAP adherence, which when using a commonly cited benchmark of four hours use/night, five nights/week, is approximately 50 per cent at six months and 17 per cent at five years (10-13).

OAT fully normalizes sleep apnea approximately a third of the time, another third will experience a clinically important reduction of greater than 50 per cent with persistent residual apnea, and the final third will not achieve this reduction (14). However, when considering adherence, in contrast to CPAP, approximately 90 per cent of patients use their oral appliance long-term

(15-17), with nightly adherence of up to 7.5 hours (16).

Notwithstanding the difference in ability to eliminate sleep apnea, numerous studies comparing health outcomes for both CPAP and OAT have demonstrated very similar results; this similar impact on health outcomes is thought to be due to the higher adherence associated with OAT. In fact, when one compares CPAP and OAT from a mean disease alleviation (MDA) perspective, which takes into consideration both the level of event reduction along with the level of therapy usage, both approaches result in an MDA of approximately 50 per cent (17). Literature clearly documents that objective health outcomes such as sleepiness, psychomotor speed, driving simulator performance, blood pressure outcomes, cardiovascular outcomes and mortality are similar (18). In addition, functional outcomes such as snoring, sleepiness, neurocognitive function, quality of life and mood are also similar (19).

The SomnoMed Effectiveness Equation is a software tool that considers a patient’s baseline and post-treatment apnea level, along with how long the therapy was actually used. The total number of apneic events throughout the night for both CPAP therapy and OAT are then calculated. Figure 1 demonstrates a situation where OAT would be deemed inadequate and CPAP therapy would be deemed adequate, yet both therapies result in a similar number of total events through the night, explained by the different level of usage.



The connection between sleep apnea and dentistry

Unmanaged sleep apnea also impacts on the dentistry we provide our patients. Sleep bruxism is associated with unmanaged sleep apnea and has been demonstrated to reduce in severity when the sleep apnea is successfully managed. A recent study involving 67 implant patients found that 13 of the 16 patients experiencing complications such as porcelain fracture, fracture of the screw or implant, loosening of the screw, and decementation had sleep apnea, with 81 per cent of the patients with sleep apnea experiencing complications with their prostheses (25). Recent studies demonstrate that unmanaged sleep apnea can increase in severity by a factor of 50 per cent for 50 per cent of patients when a brux appliance is worn, suggesting that simply providing post restorative night guards may not be the appropriate approach (26). These findings suggest that all patients should be screened for sleep apnea before undergoing any treatment plan.

CPAP is considered first line therapy for the management of sleep apnea (3). However, it is also important to note that OAT is considered a standard of care for all severities of sleep apnea if the patient cannot tolerate CPAP, or if the patient simply prefers OAT to CPAP (4). Having patients who have difficulty with CPAP remain unmanaged is simply unacceptable. It truly doesn't matter how well CPAP works if the patient cannot tolerate wearing it. After 25 years of managing sleep apnea patients with OAT, I propose that whichever therapy is provided, the most important factor that will determine if the patient will be adequately managed is the answer to this question: Will the patient use it?

What happens when OAT falls short?

When residual apnea persists with OAT all is not lost. Adjunctive therapies such as modifying sleep position (20,21), losing weight (22), improving fitness (23) and other strategies are used to help manage the sleep apnea problem even further. In addition, concern for possible ineffectiveness is not a reason to discount OAT. For those patients seeking assurance that OAT will in fact adequately manage their sleep apnea, there is a literature-validated test that can be used to establish efficacy before an oral appliance is even fabricated (MATRx Plus Zephyr Sleep Technologies, Calgary) (24). In fact, in my clinic I have managed all levels of sleep apnea including hourly events well over 100 per hour.

Societal change begins with awareness

Awareness campaigns and changes in legislation regarding driving under the influence of alcohol (27) and exposure to second-hand smoke (28) have resulted in a better quality of life for society as a whole. Analogous issues can be found regarding sleep apnea. Drowsy driving is just as incapacitating as driving under the influence of alcohol (29). Patients with unmanaged sleep apnea are often drowsy during the day (30). And studies demonstrate seven-times odds of being involved in an automobile accident among those with sleep apnea over controls (31). Furthermore, similar to the impact of second-hand smoke on innocent bystanders, studies demonstrate that bed partners of unmanaged sleep apnea patients are meaningfully impacted by second-hand sleep apnea, experiencing increased arousals and decreased sleep efficiency, with effects similar to a reduction of one hour of sleep each night (32). I predict that increasing awareness of the impact of sleep apnea on both individuals and society will result in changes in legislation and societal norms, to everyone's benefit.

COVID-19 and OAT

The COVID-19 pandemic has raised concerns around the spread of the infection throughout the household due to CPAP mask leaks in those with the infection. The AASM website guidance currently recommends



Figure 2. OAT products: ProSomnus IA, Oventus Optima, Airway Management DreamTAP, Glidewell Silent Nite, Myerson EMA, SomnoDent AVANT, Panthera D-SAD. Centre: a typical CPAP setup.


that if a CPAP user becomes positive for COVID-19, they should speak to their physician about assessing risks and benefits of continuing to use the CPAP device. According to the AADSM, OAT could be considered an effective alternative to CPAP for these patients. OAT does not share any of the aerosol concerns associated with CPAP use and is also much easier to disinfect daily in comparison to a CPAP machine, hose and mask. In fact, the AADSM currently recommends that OAT should be prescribed as a first-line therapy for sleep apnea during the COVID-19 pandemic (33). Of course, any changes in therapy should be considered only under the supervision of a physician.

Do your bit to ensure dentistry is doing enough

Dentistry is ideally positioned to help eradicate this medical problem. According to the Canadian Dental Association website, roughly 80 per cent of Canadians have a dentist and approximately 86 per cent of Canadians visit a dentist within a two-year period. Considering these statistics, if dentistry committed to actively screening each patient of record for sleep apnea, we would be able to reduce the undiagnosed level of sleep apnea dramatically. Then, together with physicians, we could all get busy helping these patients get well, whether through the use of CPAP, OAT, surgery, or by recommending lifestyle changes.

The sleep apnea OAT market is projected to grow exponentially as patient awareness increases and more dentists seek training on its clinical utility (7). General dentists that are currently overwhelmed in a competitive marketplace can differentiate themselves by becoming

knowledgeable. Recently, our dental regulator has struck a working group for the development of guidance on the dental management of obstructive sleep apnea and snoring. As well, the American Dental Association has published a document describing the role of dentistry in the management of sleep apnea (34). Dentistry currently finds itself in a unique state of opportunity; patient need, robust literature data, evidence-based guidelines, and the support of our evidence-based organizations and licensing bodies position dentistry to make a meaningful and positive impact on the prevalence of sleep apnea. There has never been a better time for dentistry to become more involved, and this is especially impactful for those patients who have demonstrated intolerance to CPAP. Learn about what OAT has to offer these CPAP-intolerant patients (Figure 2).

If you are a dentist: choose to get involved, become the local expert, learn the evidence supporting OAT, and help to ensure that dentists are in fact, doing their bit to eradicate sleep apnea. If you are a physician: be open to working collaboratively alongside qualified dentists. When one considers that more than 85 per cent of sleep apnea remains undiagnosed (1), approximately 50 per cent of diagnosed patients still need therapy (10-13) and sleep apnea holds negative implications on the dental work we so proudly provide our patients (25), it's clear that more work needs to be done. When you consider that OAT has been demonstrated to have a 90 per cent long-term adherence rate (15-17), numerous studies comparing CPAP and OAT health outcomes demonstrate similar results (18,19), and how grossly underutilized the OAT alternative is (7), the following question begs to be asked: Is dentistry doing enough? 

REFERENCES

- Benjafield AV, Ayas NT, Eastwood PR, Heinzer R, Ip MS, Morrell MJ, Nunez CM, Patel SR, Penzel T, Pépin JL, Peppard PE. Estimation of the global prevalence and burden of obstructive sleep apnoea: a literature-based analysis. *The Lancet Respiratory Medicine*. 2019 Aug 1;7(8):687-98.
- Mok EM, Greenough G, Pollack CC. Untreated obstructive sleep apnea is associated with increased hospitalization from influenza infection. *Journal of Clinical Sleep Medicine*. 2020 Dec 15;16(12):2003-7.
- Patil SP, Ayappa IA, Caples SM, Kimoff RJ, Patel SR, Harrod CG. Treatment of adult obstructive sleep apnea with positive airway pressure: an American Academy of Sleep Medicine clinical practice guideline. *Journal of Clinical Sleep Medicine*. 2019 Feb 15;15(2):335-43.
- Ramar K, Dort LC, Katz SG, Lettieri CJ, Harrod CG, Thomas SM, Chervin RD. Clinical practice guideline for the treatment of obstructive sleep apnea and snoring with oral appliance therapy: an update for 2015: an American Academy of Sleep Medicine and American Academy of Dental Sleep Medicine clinical practice guideline. *Journal of Clinical Sleep Medicine*. 2015 Jul 15;11(7):773-827.
- Frost & Sullivan. Hidden health crisis costing America billions. Underdiagnosing and undertreating obstructive sleep apnea draining healthcare system [Internet]. Darien, IL: American Academy of Sleep Medicine; 2016. Available from: <http://www.aasmnet.org/sleep-apnea-economic-impact.aspx>
- Rotenberg BW, Murariu D, Pang KP. Trends in CPAP adherence over twenty years of data collection: a flattened curve. *Journal of Otolaryngology-Head & Neck Surgery*. 2016 Dec;45(1):1-9.
- Frost & Sullivan. The price of a good night's sleep: Insights into the US oral appliance market [Internet]. Darien, IL: American Academy of Sleep Medicine; 2017. Available from: <https://www.columbussleep-center.com/assets/docs/frost-and-sullivan.pdf>
- National Association of Chain Drug Stores. Pharmacies: Improving health, reducing costs [Internet]. Arlington, VA: National Association of Chain Drug Stores; 2011. Available from: <https://www.nacds.org/pdfs/pr/2011/PrinciplesOfHealthcare.pdf>
- Schwartz M, Acosta L, Hung YL, Padilla M, Enciso R. Effects of CPAP and mandibular advancement device treatment in obstructive sleep apnea patients: a systematic review and meta-analysis. *Sleep and Breathing*. 2018 Sep;22(3):555-68.
- Chai-Coetzer CL, Luo YM, Antic NA, Zhang XL, Chen BY, He QY, Heeley E, Huang SG, Anderson C, Zhong NS, McEvoy RD. Predictors of long-term adherence to continuous positive airway pressure therapy in patients with obstructive sleep apnea and cardiovascular disease in the SAVE study. *Sleep*. 2013 Dec 1;36(12):1929-37.
- Bartlett D; Wong K; Richards D; Moy E; Espie CA; Cistulli PA; Grunstein R. Increasing adherence to obstructive sleep apnea treatment with a group social cognitive therapy treatment intervention: a randomized trial. *Sleep*. 2013;36(11):1647-1654
- Catcheside PG. Predictors of continuous positive airway pressure adherence. *F1000 Medicine Reports*. 2010;2:70.
- Sutherland K, Phillips CL, Cistulli PA. Efficacy vs. effectiveness in the treatment of OSA: CPAP and oral appliances. *Journal of Dental Sleep Medicine* 2015;2(4):175-81.
- Sutherland K, Vanderveken OM, Tsuda H, Marklund M, Gagnadoux F, Kushida CA, Cistulli PA. Oral appliance treatment for obstructive sleep apnea: an update. *Journal of Clinical Sleep Medicine*. 2014 Feb 15;10(2):215-27.
- Yoshida K. Effects of a mandibular advancement device for the treatment of sleep apnea syndrome and snoring on respiratory function and sleep quality. *CRANIO®*. 2000 Apr 1;18(2):98-105.
- Lowe AA, Sjöholm TT, Ryan CF, Fleetham JA, Ferguson KA, Remmers JE. Treatment, airway and compliance effects of a titratable oral appliance. *Sleep*. 2000 Jun 1;23:S172-8.
- Vanderveken OM, Dieltjens M, Wouters K, De Backer WA, Van de Heyning PH, Braem MJ. Objective measurement of compliance during oral appliance therapy for sleep-disordered breathing. *Thorax*. 2013 Jan 1;68(1):91-6.
- Bratton DJ, Gaisl T, Wons AM, Kohler M. CPAP vs mandibular advancement devices and blood pressure in patients with obstructive sleep apnea: a systematic review and meta-analysis. *JAMA*. 2015 Dec 1;314(21):2280-93.
- Yamamoto U, Nishizaka M, Tsuda H, Tsutsui H, Ando SI. Crossover comparison between CPAP and mandibular advancement device with adherence monitor about the effects on endothelial function, blood pressure and symptoms in patients with obstructive sleep apnea. *Heart and Vessels*. 2019 Oct;34(10):1692-702.

20. Dieltjens M, Vroegop AV, Verbruggen AE, Wouters K, Willemen M, De Backer WA, Verbraecken JA, Van de Heyning PH, Braem MJ, de Vries N, Vanderveken OM. A promising concept of combination therapy for positional obstructive sleep apnea. *Sleep and Breathing*. 2015 May 1;19(2):637-44.
21. Takaesu Y, Tsuiki S, Kobayashi M, Komada Y, Nakayama H, Inoue Y. Mandibular advancement device as a comparable treatment to nasal continuous positive airway pressure for positional obstructive sleep apnea. *Journal of Clinical Sleep Medicine*. 2016 Aug 15;12(8):1113-9.
22. Peppard PE, Young T, Palta M, Dempsey J, Skatrud J. Longitudinal study of moderate weight change and sleep-disordered breathing. *JAMA*. 2000 Dec 20;284(23):3015-21.
23. Andrade FM, Pedrosa RP. The role of physical exercise in obstructive sleep apnea. *Jornal Brasileiro de Pneumologia*. 2016 Dec;42(6):457-64.
24. Remmers JE, Topor Z, Grosse J, Vranjes N, Mosca EV, Brant R, Bruehlmann S, Charkhandeh S, Zareian Jahromi SA. A feedback-controlled mandibular positioner identifies individuals with sleep apnea who will respond to oral appliance therapy. *Journal of Clinical Sleep Medicine*. 2017 Jul 15;13(7):871-80.
25. Anitua E, Saracho J, Almeida GZ, Duran-Cantolla J, Alkhraisat MH. Frequency of prosthetic complications related to implant-borne prosthesis in a sleep disorder unit. *Journal of Oral Implantology*. 2017 Feb;43(1):19-23.
26. Gagnon Y, Mayer P, Morisson F, Rompré PH, Lavigne GJ. Aggravation of respiratory disturbances by the use of an occlusal splint in apneic patients: a pilot study. *International Journal of Prosthodontics*. 2004 Jul 1;17(4).
27. Solomon R. MADD: Lives saved in Canada due to reductions in alcohol-related crash deaths, 1982-2014 [Internet]. London, ON: MADD; 2018. Available from: http://madd.ca/media/docs/lives_saved.pdf
28. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. The health consequences of smoking—50 years of progress: A report of the Surgeon General [Internet]. Atlanta, GA; 2014. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK179276/>
29. Kuo AA. Does sleep deprivation impair cognitive and motor performance as much as alcohol intoxication? *Western Journal of Medicine*. 2001 Mar;174(3):180.
30. Garbarino S, Scoditti E, Lanteri P, Conte L, Magnavita N, Toraldo DM. Obstructive sleep apnea with or without excessive daytime sleepiness: clinical and experimental data-driven phenotyping. *Frontiers in Neurology*. 2018 Jun 27;9:505.
31. Findley LJ, Unverzagt ME, Suratt PM. Automobile accidents involving patients with obstructive sleep apnea. *American Review of Respiratory Disease*. 1988;138:337-40.
32. Beninati W, Harris CD, Herold DL, Shepard Jr JW. The effect of snoring and obstructive sleep apnea on the sleep quality of bed partners. *Mayo Clinic Proceedings*. 1999;74(10):955-8
33. Schwartz D, Addy N, Levine M, Smith H. Oral appliance therapy should be prescribed as a first-line therapy for OSA during the COVID-19 pandemic. *Journal of Dental Sleep Medicine*. 2020 May;7(3):1.
34. American Dental Association [ADA]. Policy statement on the role of dentistry in the treatment of sleep-related breathing disorders. Adopted by 2017 House of Delegates [Internet]. Chicago, IL: ADA; 2017. Available from: <https://www.ada.org/~media/ADA/Member%20Center/Files/The-Role-of-Dentistry-in-Sleep-Related-Breathing-Disorders.pdf?la=en>



Dr. John Viviano graduated from the University of Toronto in 1983. His clinic, Sleep Disorders Dentistry Research and Learning Centre — the first Canadian facility accredited by the American Academy of Dental Sleep Medicine — manages sleep-disordered breathing and sleep-related bruxism. He is a Credentialed Diplomate of the American Board of Dental Sleep Medicine and has lectured internationally, conducted original research and authored original articles on the management of sleep-disordered breathing. He can be reached at 905-212-7732, John@DrViviano.com or via website sleepdisordersdentistry.com.