Managing Obstructive Sleep Apnea with Mandibular Advancement Devices
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1. Preamble

The purpose of these guidelines is to clarify the respective areas of expertise of physicians and dentists in the treatment of obstructive sleep apnea (OSA) and primary snoring (PS). These guidelines also cover the different oral appliances (OAs), such as mandibular advancement devices (MADs), used to treat OSA and PS. The term MAD will be used throughout the document since it is the most commonly used device for this treatment, when therapy is recommended.

In addition, these guidelines define the role and responsibilities of the health professionals involved, more specifically the role and the duties of dentists in screening for these conditions. Accordingly, they describe the training and expertise needed by dentists to conduct such screening and treat patients using OAs, including MADs.

MADs are not the only form of treatment available to dentists for the management of OSA and PS. Other intraoral devices, such as tongue retaining devices, also exist, though not as often used.

Sleep apnea can also be treated with surgery (bariatric, orthognatic, ENT), orthodontics or, in specific cases, a combination of both. Combined treatments are other useful therapeutic options (CPAP-DA or CPAP-MAD) to be considered. Additional avenues for treatment are also emerging based on the latest scientific data (e.g. physiotherapy, myofunctional therapy speech therapy, acupuncture, sleep position trainers for positional apnea due to supine sleep, compression socks).

These guidelines cover only MAD-type OAs and the training related to their use. The Ordre des dentistes du Québec (the Order) could eventually publish guidelines on additional therapeutic options.

However, regardless of the type of therapy used by a dentist to treat sleep-disordered breathing, the areas of expertise and role and responsibilities of physicians and dentists will not change.
2. Glossary

**Obstructive sleep apnea (AOS)**
Sleep-disordered breathing due to recurrent obstruction of the upper airways, lasting at least 10 seconds, with consequent temporary pauses in breathing (apnea) or significant decrease of airflow (hypopnea), which can cause micro-arousals from sleep or oxygen desaturation associated with respiratory effort and, in frequent cases, snoring.

**Central sleep apnea**
Sleep-disordered breathing characterized by repeated pauses in breathing of a least 10 seconds not accompanied by respiratory effort or snoring.

**Apnea**
Individual pause in breathing of 10 seconds or more, recorded during diagnostic testing, with a reduction in the respiratory signal of 90% or more. This type of apnea can be obstructive or central.

**Hypopnea**
Distinct episode of 10 seconds or more, recorded during diagnostic testing, with a reduction in the respiratory signal of 30% or more, associated with either oxygen desaturation of 3% or a micro-arousal observed by electroencephalogram.

**Sleep Physician**
To be recognized as having expertise in sleep medicine, a doctor must:

- Be a member of the Collège des médecins du Québec
- Have an active practice in Quebec
- Be qualified in sleep medicine in accordance with the criteria specified\(^1\) by the Collège des médecins.

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2. Glossary (continued)

**Oral appliance (OA)**

General term used to describe removable oral devices that cover, in whole or in part, the upper and lower arches to maintain the mandible or tongue in a given position, for instance to free the upper airways in order to reduce, control or eliminate OSA or PS. Other equivalent terms used and found in the literature include oral, intraoral or dental appliance or device.

**Mandibular advancement device (MAD)**

Removable intraoral device covering the upper and lower arches to maintain the mandible in a forward position, helping to free the upper airways.

OAs, including MADs, can be used for:

- Patients with mild to moderate OSA
- Severe OSA patients who cannot tolerate continuous positive airway pressure therapy
- Asymptomatic patients with primary snoring, no complications and an apnea–hypopnea index below 30

**Polysomnography (PSG)**

Recording in a laboratory under the direct supervision of a sleep professional (type I) or without the supervision of a sleep professional (type II) of several parameters in order to study the various stages of sleep using an electroencephalogram, electro-oculogram, electromyogram, breathing with nasal pressure, respiratory effort and cardiac activity (electrocardiogram).
2. Glossary (continued)

(Cardiorespiratory sleep polygraphy (CRSP)
Simplified diagnostic recording of sleep generally conducted outside the laboratory setting (type III) involving several parameters. The test does not assess the various stages of sleep. The parameters recorded include, at minimum, nasal flow, respiratory effort, oxygen saturation and heart rate.

(Continuous Positive Airway Pressure (CPAP)
Treatment with a ventilation device used to push air through the upper airways in a continuous manner in order to generate positive pressure, which, in turn, keeps the airways open and prevents their collapse. It is the treatment of choice for OSA.

(Primary snoring (PS)
Respiratory sound produced during sleep by the vibration of soft tissues in partially obstructed upper airway. It is characterized by an apnea/hypopnea index under 30 and the absence of symptoms, comorbidity and occupational risk.
3. Introduction

OSA is a chronic condition, which is included in a group of disorders known as sleep-disordered breathing, along with central sleep apnea and sleep-related hypoventilation syndrome. It is more common in men than in women. After menopause, however, its prevalence increases in women.

In the United States, the occurrence of mild sleep apnea is estimated at approximately 33% in men and 17% in women, while rates for moderate to severe apnea are 13% in men and 6% in women. These data vary by population studied (Peppard et al., 2013 – Benjafile; et al., 2019).

In children, the prevalence is approximately 9%, but increases to nearly 45% in children with obesity (Andersen, 2019).

In both children and adults, the onset of obstructive respiratory problems, ranging from PS to OSA, involves the interaction of various elements, such as anatomical factors, ventilation response control centres, pharyngeal muscle response, the micro-arousal threshold and inflammation.

OSA has significant medical and socioeconomic consequences. It is associated with a greater risk for several comorbidities, including depression, hypertension, stroke, heart disease, heart failure, atrial fibrillation and diabetes. It also increases the risk of traffic accidents and decreases work productivity. In some children, OSA can resemble an attention deficit; it can also negatively affect growth and, in rare cases, cause heart failure or pulmonary hypertension.

Moreover, OSA is a major factor to be taken into consideration during interventions requiring general anesthesia, since patients with apnea have an elevated risk for pre- and post-operative complications, such as oxygen desaturation and obstruction of the upper airways.

In the overall management of OSA, sleep physicians are responsible for diagnosing and selecting the choice of treatment. Dentists, however, play an important role as well since the condition affects anatomical structures that are part of or closely related to their field of care. Additionally, OSA can be associated with comorbidities involving the orofacial area, including morning headaches, bruxism, orofacial pain, gastric esophageal reflux disease (GERD) and xerostomia. Moreover, dentists possess the knowledge and skills needed to carry out some of the treatments of OSA. In sum, these guidelines are meant to define the role and responsibilities of dentists in screening and treating OSA with OAs, including MADs, based on a multidisciplinary approach and interprofessional cooperation with sleep physicians.
4. Role of the Physician

The diagnosis and choice of treatment of OSA and PS are within the field of expertise of sleep physicians. Dentists cannot treat OSA or PS using an OA without a prescription from a doctor who has previously examined the patient.

Here is the detailed role of physicians:

• To examine patients, prescribe PSGs, interpret PSG results and establish a diagnosis.

• To determine a treatment plan and alternative treatments, inform patients of their options and obtain their consent.

• To produce the prescription for treatment with an OA to be carried out by a dentist trained in sleep medicine.

• During OSA treatment, physicians can remind patients to undergo a control PSG or CRSP, if prescribed when initiating the treatment plan, after the final fitting of the OA by the dentist in order to assess therapeutic efficacy. Physicians may ask patients to make an appointment after the final fitting to obtain a prescription for the control PSG or CRSP.

• During PS treatment, physicians inform patients that a follow-up appointment will be needed after the final fitting of the OA by the dentist to ensure the continued absence of OSA.

When an OA is the treatment of choice, the sleep physician will prepare a prescription that will include the following information:

• The diagnosis (including the severity of the condition)

• The treatment indicated

• Other therapies previously tried, if applicable

• All relevant information on the patient’s state of health

• Medical follow-up needed after the final fitting of the OA (control PSG or CRSP on treatment efficacy or medical follow-up)
5. Role and Responsibilities of the Dentist

5.1 Screening

Given their area of expertise, dentists play a leading role in the screening of OSA and PS. Since dentists are in a unique position to recognize some of the conditions that predispose patients to these diseases, they must have general knowledge of sleep-related breathing disorders and the required qualifications to:

- Screen for OSA and PS
- Refer patients to a sleep physician for a diagnosis or, as needed, to a family physician.

In doing so, dentists are helping to prevent in their patients secondary diseases associated with OSA.

To be qualified to screen for these conditions, dentists must complete basic training on sleep-disordered breathing, including OSA and PS, either as part of their undergraduate or graduate studies in dentistry, or as part of a continuing education program. This basic training must last a minimum of six hours.

Mandatory topics to be covered in the basic training include:

- Physiology and sleep-disordered breathing
- The anatomy of upper airway structures
- Anatomical and functional impairments associated with OSA
- OSA
- Primary snoring
- Screening protocols
- Diagnostic tests and their interpretation
- Medical treatments
- Dental treatments (orthodontics, surgery, devices)
- Sleep hygiene

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5. Role and Responsibility of the Dentist (continued)

5.2 Treatment

OAs can be recommended as treatment for patients with mild to moderate OSA or severe OSA patients who cannot tolerate CPAP therapy. It is the treatment of choice for PS.

Dentists who wish to offer treatment using OAs are required to complete advanced training of at least 40 hours.

Topics covered during the advanced training:

- Anatomy of the upper airways
- Sleep physiology and the administration of various tests (PSG, CRSP, oximetry)
- Adult respiratory physiology
- Pediatric respiratory physiology
- Adult respiratory pathology
- Pediatric respiratory pathology
- The biomechanics of OAs
- Adult orthodontic mechanics
- Pediatric orthodontic mechanics
- Occlusion with OAs
- Pain management
- The establishment of a suitable treatment plan based on the oral health and craniofacial morphology of the patient (occlusal splint, MAD, tongue retaining device or equivalent)
- Steps involved in making an OA, including imprints, articulation and required adjustments at fitting
- Management of treatment side effects
- Jointly with the referring doctor, monitoring of the evolution of the sleep disorder

The overall treatment sequence of OSA with MADs is presented in Appendix 2.
5. Role and Responsibility of the Dentist (continued)

5.3 Follow-up

Once dentists have adjusted the OA to its optimal level, they must remind patients to undergo a post-intervention PSG or CRSP to assess the efficacy of the treatment. Patients can make their own appointment for a PSG or CRSP if they have a prescription.

For treatment of PR with OAs, dentists must inform patients to consult their sleep physician for regular follow-ups to ensure that no underlying OSA has developed.

Dentists are also required to let their patients know that regular dental appointments will be needed to assess the integrity of the OA, check its fit and ensure the maintenance of oral health (teeth, gums, temporomandibular articulation).

If a dentist finds that the use of an OA represents a risk for a patient's oral health and that treatment cessation may be necessary, the patient must be informed and referred to a trained sleep physician. The sleep physician will determine whether treatment should continue despite the risks or if an alternative treatment is possible. In such cases, dentists must impress upon their patients the importance of continuing the treatment until the consultation with the physician and inform them of the health risks associated with ceasing treatment (e.g., impact on cardiovascular health, risk of accidents when operating a vehicle or heavy machinery).
APPENDIX 1

SCREENING – PREDISPOSING CONDITIONS, RISK FACTORS AND SYMPTOMS OF OBSTRUCTIVE SLEEP APNEA

- Signs and symptoms at exam
  - Snoring
  - Drowsiness
  - Obesity
  - Microretrognatia
  - Hypertension

- Daytime symptoms
  - Fatigue
  - Lack of energy
  - Problems with concentration, attention, irritability
  - Morning headaches
  - Reduced libido

- Nighttime symptoms
  - Snoring
  - Sore throat
  - Choking
  - Sweating
  - Xerostomia (dry mouth)
  - Reduced libido

- Signs at physical exam
  - Excessive adipose tissue
  - Large neck circumference
  - Long and narrow face
  - High-vaulted palate
  - Crossbite
  - Crowding of teeth
  - Mouth breathing
  - Narrow jaw
  - Malocclusion
  - Cleft palate
  - Macroglossia
  - Visible tongue indentations
  - Enlarged tonsils
  - Elongated uvula

- Risk factors
  - Obesity
  - Large neck circumference
  - Family history
  - Being male
  - Menopause
  - Age
  - Enlarged tonsils, adenoids or any other factor causing an obstruction of the upper airways
APPENDIX 2

TREATMENT SEQUENCE FOR OBSTRUCTIVE SLEEP APNEA WITH MANDIBULAR ADVANCEMENT DEVICES

1. A dentist who has completed basic or advanced training on sleep-disordered breathing proceeds to screen for OSA or PS.

2. The dentist refers the patient to a sleep physician or family doctor.

3. The sleep physician prescribes a PSG or CRSP, interprets the results, establishes a diagnosis, develops a treatment plan, obtains the patient's consent and refers the patient to a dentist who has completed advanced training on sleep-disordered breathing.

4. The dentist examines the patient, establishes the dental diagnosis, develops the treatment plan, obtains the patient's consent and delivers the treatment.

5. The dentist ensures that the patient takes the necessary measures to undergo a control PSG or CRSP with the physician for cases of OSA or a medical follow-up for cases of PS.

6. The dentist monitors the patient's oral health and the integrity and proper fit of the OA.
BIBLIOGRAPHIC REFERENCES


