# Policy on Obstructive Sleep Apnea (OSA)

## Latest Revision

2021

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## Purpose

The American Academy of Pediatric Dentistry (**AAPD**) recognizes that obstructive sleep apnea (**OSA**) occurs in the pediatric population. Undiagnosed or untreated OSA is associated with cardiovascular complications, impaired growth (including failure to thrive), learning problems, and behavioral problems.[1] In order to reduce such complications, AAPD encourages healthcare professionals to routinely screen their patients for increased risk for OSA and to facilitate medical referral when indicated.

## Methods

This policy was developed by the Council on Clinical Affairs and adopted in 2016.[2] This revision is based on a review of current dental and medical literature pertaining to obstructive sleep apnea including a search with PubMed®/MEDLINE using the terms: sleep apnea AND dentistry, obstructive sleep apnea AND dentistry, obstructive sleep apnea AND attention-deficit hyperactivity disorder (**ADHD**), sleep disordered breathing; fields: all; limits: within the last ten years, humans, all children zero to 18 years, English, clinical trials, and literature reviews. The search returned 283 articles. When data did not appear sufficient or were inconclusive, policies were based upon expert and/or consensus opinion by experience researchers and clinicians.

## Background

OSA is a disorder of breathing characterized by episodes of complete or partial upper airway obstruction during sleep, often resulting in gas exchange abnormalities and arousals that cause disrupted sleep.[1,3] OSA affects approximately 25 million people in the United States and is a common form of sleep-disordered breathing.[4] The presentation, diagnostic criteria, course, and complications of OSA differ significantly between adults and children.[1] Pediatric OSA differs from adult OSA due to several developmental, physiological, and maturational factors related to respiration and sleep parameters.[5] The condition exists in one to five percent of children and can occur at any age but may be most common in children ages two to seven.[6-8] In prepubertal children, the disease occurs equally among boys and girls; in adolescents, data suggest the prevalence may be higher in males.[1] Adult and pediatric OSA and sleep-related hypoventilation disorders are defined by different criteria.[1] Adult criteria for OSA may be used for patients aged 13-18 years.[1] Early diagnosis and treatment of OSA may decrease morbidity and improve quality of life; however, diagnosis frequently is delayed.[3,9]

The pathophysiology underlying upper airway narrowing during sleep is multifactorial.[1,19] Obstructive sleep apnea occurs when the pharyngeal dilating muscles relax, causing the airway to narrow on inspiration. This, in turn, may lower oxygen and increase carbon dioxide levels in the blood. Decreased end-expiratory lung volume, failing ventilatory drive, respiratory arousal threshold, muscle responsiveness, and unstable ventilatory control (high loop gain) also may contribute to airway narrowing.[1,10] Mechanisms of apnea/hypopnea termination are controversial.[1] Respiratory events may resolve with augmentation of the upper airway muscle tone from chemical stimuli (low partial pressure of oxygen [PaO2], high partial pressure of carbon dioxide [PaCO2]), mechanical stimuli from changes in lung volume (upper airway mechanoreceptors), or change of sleep state (arousal) at either the cortical or subcortical level.[1] Arousals related to obstructive events cause sleep fragmentation which is believed to be responsible for excessive daytime sleepiness in older children or adolescents and hyperactivity, behavioral problems, and impaired academic performance in younger children.[1] For this reason, children with untreated OSA may be inappropriately diagnosed as having ADHD.[11]

OSA differs from central sleep apnea (**CSA**). CSA is less common and occurs when the brain fails to transmit signals to the muscles of respiration.[11] The most common conditions associated with CSA include neurological or neurosurgical conditions (e.g., Arnold-Chiari malformation, brain tumor), genetic conditions (e.g., Down syndrome, Prader-Willi syndrome, achondroplasia), congestive heart failure, stroke, high altitude, and use of certain medications (e.g., narcotics, benzodiazepines, barbiturates).[1] Premature infants also may be predisposed to CSA.[1]

Symptoms of OSA include:[1,3]

- excessive daytime sleepiness.
- loud snoring three or more nights per week.

**ABBREVIATIONS**

**AAPD:** American Academy of Pediatric Dentistry. **ADHD:** Attention-deficit hyperactivity disorder. **CPAP:** Continuous positive airway pressure. **CSA:** Central sleep apnea. **MADs:** Mandibular advancement devices. **OSA:** Obstructive sleep apnea. **RPE:** Rapid maxillary/palatal expansion.

- episodes of breathing cessation witnessed by another person.
- abrupt awakenings accompanied by shortness of breath.
- awakening with dry mouth or sore throat.
- morning headache.
- difficulty staying asleep.
- unusual sleep positions (seat or neck hyperextended).
- attention problems.
- mouth breathing.
- diaphoresis.
- restlessness.
- frequent awakenings.

Signs of untreated sleep apnea in school-aged children may include nocturnal enuresis (bed wetting), poor school performance, aggressive behavior, or developmental delay.[3,12] Rare sequelae of untreated OSA include brain damage, seizures, coma, and cardiac complications.[1,3,13,14] Children with OSA also may experience impaired growth.[3,15]

**Etiology of pediatric OSA**

In most children who are otherwise healthy, narrowing of the upper airway is due primarily to adenotonsillar hypertrophy.[1] However, pediatric OSA may be related to inadequate airway size, inadequate neuromuscular tone of the airway muscles, or both.[16] Patients with certain anatomic anomalies, craniofacial anomalies, neuromuscular diseases, or hypotonia are at increased risk for development of obstructive sleep apnea.[17] Anatomic anomalies may include hypertrophic tonsils and adenoids, macroglossia, choanal atresia, respiratory tissue thickening (e.g., caused by disease such as mucopolysaccharidosis), or obesity.[18] Neuromuscular disorders with a component of hypotonia (e.g., cerebral palsy, myotonic dystrophies, other myopathies) predispose children to OSA.[3,18] Exposure to environmental tobacco smoke also has been associated with OSA.[3,19]

Children with craniofacial differences (e.g., craniosynostotic syndromes, achondroplasia, Pierre Robin sequence, cleft lip and palate) have an increased risk of having OSA because of modified craniofacial morphology.[18,20] Midface deficiency, with or without micrognathia, may predispose some children to OSA.[20] Certain surgical procedures (e.g., pharyngeal flaps to correct velopharyngeal insufficiency) also may contribute to OSA.[1]

**Screening and diagnosis of OSA**

Pediatric dentists are in a unique position to be able to identify patients at greatest risk.[21] Adenotonsillar hypertrophy[9] and obesity[22] are major risk factors for OSA in otherwise healthy children. With a history and careful clinical examination at each dental visit, pediatric dentists may identify signs and symptoms that may raise a concern for OSA. Assessment of tonsillar hypertrophy and percentage of airway obstruction by supine Mallampati classification[23] or the Friedman tongue position (FTP)[24] may be performed as part of the routine intraoral examination.

Validated screening tools are available for adult obstructive sleep apnea (e.g., STOP-BANG, STOP, Berlin questionnaire, Epworth sleepiness scale)[25]; however, questionnaires for the pediatric population (e.g., PSQ, OSA-18) are not sensitive enough to detect presence or severity of OSA[26]. Nonetheless, the inclusion of sleep questions on the health history form may further help identify patients at risk. Such questions might include:

- does your child snore loudly when sleeping?
- does your child have trouble breathing while sleeping?
- does your child stop breathing during sleep?
- does your child occasionally wet the bed at night?
- is your child hard to wake up in the morning?
- does your child complain of headaches in the morning?
- does your child tend to breathe through his/her mouth during the day?
- have you or the teacher commented your child appears sleepy during the day?
- does your child fall asleep quickly?

If a patient is suspected of being at risk for OSA, a referral to a medical specialist (e.g., otolaryngologist, pulmonologist, sleep medicine physician) allows for further assessment including polysomnography (sleep study) to either confirm or deny the diagnosis.[27] The American Academy of Pediatrics recommends polysomnography be performed in children/adolescents with snoring and signs/symptoms of OSA.[3] The threshold for the diagnosis of OSA based on the apnea hypopnea index (AHI) is lower in children than in adults.[1] A positive diagnosis of OSA made by a sleep physician would involve the presence of signs/symptoms concurrent with at least one predominantly obstructive respiratory event, mixed apnea, or hypopnea per hour of sleep or a pattern of obstructive hypoventilation with hypercapnia for at least 25 percent of total sleep time during the polysomnography.[1]

**Treatment of OSA**

Treatment for OSA may be accomplished with either nonsurgical or surgical options, depending on its severity and etiology. Nonsurgical options include treatment of nasal allergies[28], continuous positive airway pressure (**CPAP**)[29], weight reduction, and changes in sleep position.[3] Some studies have advocated the use of nonsurgical dental interventions; however, these reports were based on small sample sizes and lack control groups.[19] Rapid maxillary expansion (RME) used to normalize maxillary transverse deficiencies and mandibular advancement devices (**MADs**) for Class II malocclusion correction are examples of orthodontic therapy that may be useful for managing OSA. Cumulative evidence to date on the use of rapid maxillary/palatal expansion consists of small uncontrolled studies with a relatively short follow-up period.[30] MADs are an alternative to CPAP to treat OSA in adult patients[31]; however, they are not routinely used in growing children[32]. As functional intraoral appliances alter the position and/or growth of the maxilla or mandible, a complete

orthodontic assessment including records should be completed prior to initiating appliance therapy.[20] Through consultation with the physician, the dentist can determine if adjunctive options (e.g., RPE, orthodontia) are advised as part of a multidisciplinary treatment effort.[20] When an intraoral appliance is used for OSA, reassessment of symptoms throughout therapy helps determine if the treatment is beneficial.[3] The most common surgical option for treatment of OSA is adenotonsillectomy.[33] Other surgical options include uvulopalatopharyngoplasty, ablation, revision of previous posterior pharyngeal flap surgery, maxillomandibular advancement, distraction osteogenesis, or tracheostomy.[34,35]

**Complications of untreated OSA**

In addition to the comorbidities listed previously (e.g., cardiovascular problems, impaired growth, learning problems, behavioral problems), untreated OSA in combination with insulin resistance and obesity in a child sets the stage for heart disease and endocrinopathies.

Pediatric dentists who perform sedation and surgical procedures in patients with OSA should be aware that these patients are more likely to experience perioperative and postoperative breathing complications.[36] Performing an airway assessment in conjunction with the caregiver, especially when considering sedation or general anesthesia, may help identify patients at increased risk for OSA or peri-/post-operative breathing complications. These individuals may benefit from referral to a medical professional for further evaluation, diagnosis, and management.

## Policy statement

Recognizing that there may be consequences of untreated OSA, the AAPD encourages health care professionals to:

- screen patients for sleep-related breathing disorders such as OSA and primary snoring.
- assess the tonsillar pillar area for hypertrophy.
- assess tongue positioning as it may contribute to obstruction.
- recognize obesity may contribute to OSA.
- recognize craniofacial anomalies may be associated with OSA.
- refer to an appropriate medical provider (e.g., otolaryngologist, sleep medicine physician, pulmonologist) for diagnosis and treatment of any patient suspected of having OSA.
- consider nonsurgical intraoral appliances only after a complete orthodontic/craniofacial assessment of the patient's growth and development as part of a multidisciplinary approach.

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