Screening for Obstructive Sleep Apnea in Adults
US Preventive Services Task Force Recommendation Statement

US Preventive Services Task Force

**Importance** Current prevalence of obstructive sleep apnea (OSA) in the US is not well established; however, based on cohort and survey data in 2007-2010 the estimated prevalence of at least mild OSA (defined as an apnea-hypoxia index [AHI] ≥5) plus symptoms of daytime sleepiness among adults aged 30 to 70 years was 14% for men and 5% for women, and the estimated prevalence of moderate to severe OSA (defined as AHI ≥15) was 13% for men and 6% for women. Severe OSA is associated with increased all-cause mortality. Other adverse health outcomes associated with untreated OSA include cardiovascular disease and cerebrovascular events, type 2 diabetes, cognitive impairment, decreased quality of life, and motor vehicle crashes.

**Objective** To update its 2017 recommendation, the US Preventive Services Task Force (USPSTF) commissioned a systematic review to evaluate the benefits and harms of screening for OSA in adults.

**Population** Asymptomatic adults (18 years or older) and adults with unrecognized symptoms of OSA.

**Evidence Assessment** The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for OSA in the general adult population.

**Recommendation** The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for OSA in the general adult population. (I statement)

**USPSTF Assessment of Magnitude of Net Benefit** The US Preventive Services Task Force (USPSTF) concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for OSA in the general adult population.

See the Summary of Recommendation figure.

**Importance** The current prevalence of obstructive sleep apnea (OSA) in the US is not well established. Based on cohort and survey data from 2007-2010, the estimated prevalence of at least mild OSA (defined as an apnea-hypoxia index [AHI] ≥5) plus symptoms of daytime sleepiness among adults aged 30 to 70 years was 14% for men and 5% for women, and the estimated prevalence of moderate to severe OSA (defined as AHI ≥15) was 13% for men and 6% for women. Severe OSA is associated with increased all-cause mortality. Other adverse health outcomes associated with untreated OSA include cardiovascular disease and cerebrovascular events, type 2 diabetes, cognitive impairment, decreased quality of life, and motor vehicle crashes.

See the Table for more information on the USPSTF recommendation rationale and assessment and the eFigure in the Supplement.
Obstructive sleep apnea is a sleep disorder characterized by episodes of narrowing and obstruction of the pharyngeal airway during sleep, resulting in reductions or cessations in airflow despite ventilatory effort. Total airway obstruction for more than 10 seconds is defined as apnea, whereas hypopnea is a partial airway obstruction with at least a 3% reduction in blood oxygen saturation or sleep arousals. Obstructive sleep apnea is defined as more than 5 apneic, hypoxic, or sleep arousal events per hour despite efforts to breathe. The AHI is used to define the severity of OSA. In general, mild OSA is defined as 5 to 15 events per hour, moderate OSA as 16 to 30 events per hour, and severe OSA as more than 30 events per hour. Common clinical signs and symptoms of OSA include excessive daytime sleepiness, unrefreshing sleep despite length of sleep, loud or irregular snoring, and choking or gasping while asleep.

Risk Factors
Risk factors associated with OSA include male sex, older age (40-70 years), postmenopausal status, higher body mass index (BMI), craniofacial and upper airway abnormalities (eg, enlarged tonsils or long upper airway). Black, Hispanic/Latino, and Native American/Alaska Native persons have a higher prevalence of OSA compared with White persons; some evidence suggests that these differences are partially explained by higher rates of obesity, asthma, and tobacco use among these groups.

Screening Tests
There are several screening questionnaires and clinical prediction tools that attempt to identify persons at higher risk of OSA. Many combine questions about clinical findings (eg, BMI and neck circumference) with questions about symptoms associated with OSA. Potential screening questionnaires and clinical prediction tools include the Epworth Sleepiness Scale (ESS), STOP questionnaire (snoring, tiredness, observed apnea, high blood pressure), STOP-BANG questionnaire (STOP questionnaire plus BMI, age, neck circumference, and gender), Berlin Questionnaire, Wisconsin Sleep Questionnaire, and the Multivariable Apnea Prediction tool. However, none of these instruments have been adequately validated in general populations enrolled from primary care settings.

Persons with suspected OSA are usually diagnosed using polysomnography, which combines several measurements, including an electroencephalogram, electro-oculogram, chin electromyelogram, airflow monitor, oxygen saturation, respiratory effort, and electrocardiogram or heart rate. Additional recommended measurements include body position and leg movements. The resultant AHI measured during polysomnography is representative of the frequency of events and used to describe the severity of disease or condition.

Treatment
A positive airway pressure device, which uses compressed air to maintain the airway, is the primary treatment for OSA. For patients with overweight and obesity, weight loss is also recommended. Mandibular advancement devices (MADs) are an alternative therapy to positive airway pressure for patients with OSA who prefer them.
Obstructive sleep apnea (OSA) is a sleep disorder characterized by repetitive episodes of upper airway collapse during sleep, leading to disrupted sleep and associated health consequences.

**Potential Preventable Burden**

OSA can be associated with multiple adverse health outcomes, including cardiovascular disease, cerebrovascular events, type 2 diabetes, cognitive impairment, decreased quality of life, and motor vehicle crashes. Severe OSA is associated with increased all-cause mortality.

**Surgical Interventions**

Surgical interventions for OSA are available but are generally not considered first-line treatments. They are most effective in patients with obesity-related OSA.

**Potential Harms**

Potential harms of surgical interventions include incidence of recurrence rates of OSA from mild to severe disease, which is less clear. Therefore, reported harms of treatment with positive airway pressure and mandibular advancement devices can improve intermediate outcomes.

**Current Practice**

Most primary care clinicians do not routinely screen for OSA, and most patients do not discuss sleep-related symptoms with their primary care clinicians. One study found that only 20% of patients with sleep-related symptoms spontaneously reported them to their primary care clinicians. For persons with suspected OSA, their clinicians should use their clinical judgment regarding whether to screen and how to screen for OSA.

**Potential Preventable Burden**

Adverse health outcomes associated with untreated OSA include cardiovascular disease and cerebrovascular events, type 2 diabetes, cognitive impairment, decreased quality of life, and motor vehicle crashes. Severe OSA is associated with increased all-cause mortality.

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Surgical interventions for OSA are available but generally not considered first-line treatments. They are most effective in patients with obesity-related OSA.

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current practice is usually referral to a specialist for appropriate diagnostic testing and treatment.20

Update of Previous USPSTF Recommendation

This recommendation replaces the 2017 USPSTF recommendation on screening for OSA. In 2017, the USPSTF found insufficient evidence to assess the balance of benefits and harms of screening for OSA in asymptomatic adults (I statement). This recommendation statement is consistent with the I statement from 2017.21

Supporting Evidence

Scope of Review

The USPSTF commissioned a systematic review to evaluate the benefits and harms of screening for OSA in adults.15,16 The systematic review also evaluated the evidence on the benefits and harms of treatment of OSA on intermediate outcomes (eg, change in AHI and blood pressure) and health outcomes (eg, mortality, quality of life, cardiovascular and cerebrovascular events, and cognitive impairment).

Accuracy of Screening Tests and Risk Assessment

Seven studies assessed 1 or more clinical prediction tools or screening questionnaires compared with facility-based polysomnography: 2 studies assessed the Berlin Questionnaire, 4 studies the STOP-BANG questionnaire, and 2 studies the Multivariable Apnea Prediction tool. Study sizes ranged from 43 to 1033 participants, and studies were generally conducted in participants with underlying conditions such as hypertension, type 2 diabetes, or Alzheimer disease or in persons with symptoms.15,16 The Berlin Questionnaire had sensitivity ranging from 37% to 80% and specificity ranging from 0% to 84% for detecting mild OSA. In the 2 studies evaluating the original STOP-BANG questionnaire, both found good sensitivity (87% to 94%) but low specificity (0% to 38%) for detecting OSA at different AHI cut points.15,16 Two studies assessed a modified version of the STOP-BANG questionnaire (different scoring criteria) in different populations; sensitivity ranged from 61% to 100% and specificity ranged from 21% to 76% for detecting OSA at different AHI cut points.15,16

In the 2 studies that assessed the Multivariable Apnea Prediction tool alone and when followed by an unattended home sleep test, sensitivity ranged between 88% and 92% and specificity ranged between 44% and 76% to predict severe OSA syndrome (defined in the study as AHI ≥30 and ESS score ≥10).15,16 However, these studies were conducted in populations that had a high prevalence of OSA (and thus more likely to be symptomatic) and a high risk of spectrum bias (ie, the study population did not represent the general primary care population).

Benefits of Early Detection and Treatment

The USPSTF found no studies that directly evaluated the effect of screening for OSA on health outcomes. The USPSTF did identify and review studies on the effect of treatment on intermediate outcomes and health outcomes.

Intermediate Outcomes

The USPSTF reviewed evidence from 4 systematic reviews of good-quality treatment trials evaluating the effect of positive airway pressure or MADs on intermediate outcomes, including AHI and blood pressure.15,16

Three systematic reviews focused on the benefit of positive airway pressure for reducing blood pressure outcomes. One review limited to minimally symptomatic, asymptomatic, or nonsleepy populations pooled data comparing positive airway pressure with controls and demonstrated an association with a small reduction in daytime diastolic blood pressure (−0.92 mm Hg [95% CI, −1.39 to −0.46 mm Hg]; 5 trials; 1541 participants; I² = 0) and no significant difference between groups in daytime systolic blood pressure (−0.51 mm Hg [95% CI, −3.39 to 2.38 mm Hg]; I² = 84%). A second review of positive airway pressure that included trials of any OSA severity and symptoms pooled analyses and showed that positive airway pressure was associated with a reduction in mean 24-hour blood pressure of −2.63 mm Hg (95% CI, −3.86 to −1.39 mm Hg; 8 trials; 994 participants; I² = 0%).8 The third review of positive airway pressure was limited to populations with resistant hypertension (23 trials; 4905 participants); pooled analysis showed a reduction in mean 24-hour systolic blood pressure (−5.06 mm Hg [95% CI, −7.98 to 2.13 mm Hg]; I² = 84%) and mean 24-hour diastolic blood pressure (−4.21 mm Hg [95% CI, −6.50 to −1.93 mm Hg]; I² = 81%). One review found benefits associated with MADs compared with inactive control for improving blood pressure; however, differences between groups were imprecise and not statistically significant.15,16

Two reviews reported on the difference between groups in change from baseline AHI with positive airway pressure. The pooled estimates in AHI reduction favoring positive airway pressure were generally consistent. The review that limited inclusion to studies of asymptomatic adults with OSA or those of minimally symptomatic, nonsleepy adults found a pooled mean difference of −15.57 events per hour (95% CI, −29.32 to −1.82 events per hour; 3 trials; 1541 participants).15,16

Health Outcomes: Positive Airway Pressure Devices

Sixty-three randomized clinical trials (RCTs) comparing positive airway pressure with sham treatment or another inactive control reported on at least 1 health outcome. Most trials enrolled participants from sleep clinics, and no trial enrolled screen-detected populations from a primary care setting.15,16

Thirty-one RCTs reported on mortality; however, 28 of these trials reported mortality rates at 12 weeks or less, and 25 of these trials reported no deaths in any study group. Three RCTs assessed mortality over a longer duration, and none found a statistically significant difference between groups. Similarly, the short duration of most trials and the small number of total events makes it difficult to assess the effect of positive airway pressure on cardiovascular and cerebrovascular events.15,16

Forty-eight trials reported on changes in excessive daytime sleepiness using the ESS. The meta-analysis found that positive airway pressure was associated with reduced mean ESS scores more than controls (pooled mean difference, −2.30 [95% CI, −2.72 to −1.88]; 48 trials; 7099 participants). This pooled mean difference is within the range some consider as minimally clinically important for the ESS (−2 to −3).15,16

Twenty-eight RCTs reported measures of general health-related quality of life and 17 RCTs reported measures of sleep-related quality of life (using a variety of questionnaires). Overall, positive airway pressure was associated with small improvements
in both general health-related and sleep-related quality of life. However, these improvements are not considered clinically meaningful (ie, less than a minimal clinically important difference).\textsuperscript{15,16}

**Health Outcomes: MADs**

Twelve trials assessed the effect of MADs on health outcomes. All studies recruited participants with known or suspected OSA from specialty clinics. Treatment duration ranged from 4 to 12 weeks in most trials.\textsuperscript{15,16}

Ten trials were included in a meta-analysis reporting on change in ESS score among groups randomized to MADs or an inactive control. It found that MADs were associated with improved ESS scores more than controls (pooled mean difference, \(-1.67 [95\% \text{ CI}, -2.09 \text{ to } -1.25]\); 10 trials; 1540 participants; \(I^2 = 36\%\); however, this change falls below the range considered a minimal clinically important difference for the ESS.\textsuperscript{15,16} Several studies reported on various quality-of-life metrics. Overall, the findings were inconsistent or imprecise, making it difficult to draw conclusions on the quality-of-life benefits related to MADs. Four trials reported on mortality; however, the duration of reporting was short (1 to 12 weeks) and only 1 death was reported in the intervention group.\textsuperscript{15,16}

**Harms of Screening and Treatment**

The USPSTF found no studies that directly evaluated harms associated with screening for OSA. Nineteen trials reported on harms associated with treatment of OSA using positive airway pressure or MADs. In general, reporting on harms related to treatment was sparse, and no trial included screen-detected persons identified from a primary care setting.\textsuperscript{15,16}

Ten studies (\(n = 2064\)) reported on harms of treatment with positive airway pressure. Follow-up in these studies was generally from 8 to 12 weeks. Overall, 1\% to 47\% of trial participants reported any harms from treatment with positive airway pressure, including oral or nasal dryness, eye or skin irritation, rash, epistaxis, and pain. In general, harms related to positive airway pressure treatment were short-lived and could be alleviated by discontinuing treatment or by supplementing positive airway pressure with additional interventions.\textsuperscript{15,16}

Ten trials (\(n = 684\)) reported on harms of treatment with MADs. Follow-up in these trials was generally from 4 to 8 weeks. In general, findings were imprecise. In 7 trials, 17\% to 74\% of participants reported oral mucosal, dental, or jaw symptoms, compared with 0\% to 17\% of participants in comparator groups (sham treatment, no treatment, or conservative management). In 4 trials, 5\% to 33\% of participants reported oral dryness, compared with 0\% to 3\% in control groups, and in 3 trials, 23\% to 68\% of participants reported excessive salivation, compared with 0\% to 3\% in comparator groups.\textsuperscript{15,16}

**Response to Public Comment**

A draft version of this recommendation statement was posted for public comment on the USPSTF website from March 29, 2022, to April 25, 2022. Some comments expressed concern that the recommendation statement does not adequately differentiate persons who are asymptomatic from those with unrecognized symptoms. In response, the USPSTF added clarifying language to describe common symptoms of OSA and defined what is meant by persons with unrecognized symptoms. Comments also proposed that the USPSTF call for screening in patients considered at higher risk. The USPSTF recognizes that certain groups are at increased risk of OSA but did not find any studies that directly evaluated the effect of screening for OSA on health outcomes. The USPSTF wishes to clarify that its statement is neither a recommendation for nor against screening. Clinicians should continue to use their clinical judgment to determine if screening is appropriate for individual patients. Comments asked why the recommendation statement focused only on positive airway pressure and MADs and excluded surgical interventions. The focus of this recommendation is first-line therapies for OSA. Surgical therapies are typically reserved for patients who do not respond to first-line therapies or have more severe symptoms (and thus are less likely to be asymptomatic or referred from primary care).

Several respondents asked the USPSTF to specify the types of studies it needs to fill evidence gaps and to consider study types other than RCTs. The USPSTF wishes to clarify that there are no generic criteria (ie, only considering RCTs) for the types of evidence it would consider for review. The criteria for consideration depend on the type and quality of evidence the USPSTF needs to make an accurate determination of benefits and harms of delivering a preventive health service.

**Research Needs and Gaps**

More studies are needed that address the following areas.

- Well-designed studies of OSA screening in asymptomatic populations representative of the US primary care population that evaluate the benefits and harms of screening on health outcomes (eg, mortality, cardiovascular disease events, motor vehicle crashes, and quality of life) in screened vs unscreened persons.
- Accuracy studies of screening tools in a general US adult primary care population, especially in persons with unrecognized or mild symptoms.
- Development of accurate risk assessment tools that can identify populations most likely to benefit from OSA screening.
- More data on the natural history of OSA; in particular, the rates of progression from mild to severe OSA, the length of duration before progression, and the magnitude of benefit if OSA is identified and treated earlier.

**Recommendations of Others**

Most groups do not recommend routine screening in primary care settings among populations without signs or symptoms of OSA. US Department of Veterans Affairs guidelines suggest using the STOP questionnaire to stratify the risk of OSA among patients who report sleep issues (weak recommendation) and also suggest assessing for sleep-disordered breathing in patients with a history of cardiovascular or cerebrovascular events, congestive heart failure, and chronic opioid use (weak recommendation).\textsuperscript{22} The American Academy of Sleep Medicine has a health advisory recommending annual OSA screening for adult patients who belong to certain high-risk groups.\textsuperscript{23} In 2014, the American College of Physicians recommended conducting a sleep study for patients with unexplained daytime sleepiness (weak recommendation, low-quality evidence).\textsuperscript{24}

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ARTICLE INFORMATION

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Additional Information: The US Preventive Services Task Force (USPSTF) makes recommendations about the effectiveness of specific preventive care services for patients without obvious related signs or symptoms. It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment. The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision-making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms. Published by JAMA—Journal of the American Medical Association under arrangement with the Agency for Healthcare Research and Quality (AHRQ). ©2022 AMA and United States Government, as represented by the Secretary of the Department of Health and Human Services (HHS), by assignment from the members of the United States Preventive Services Task Force (USPSTF). All rights reserved.

REFERENCES