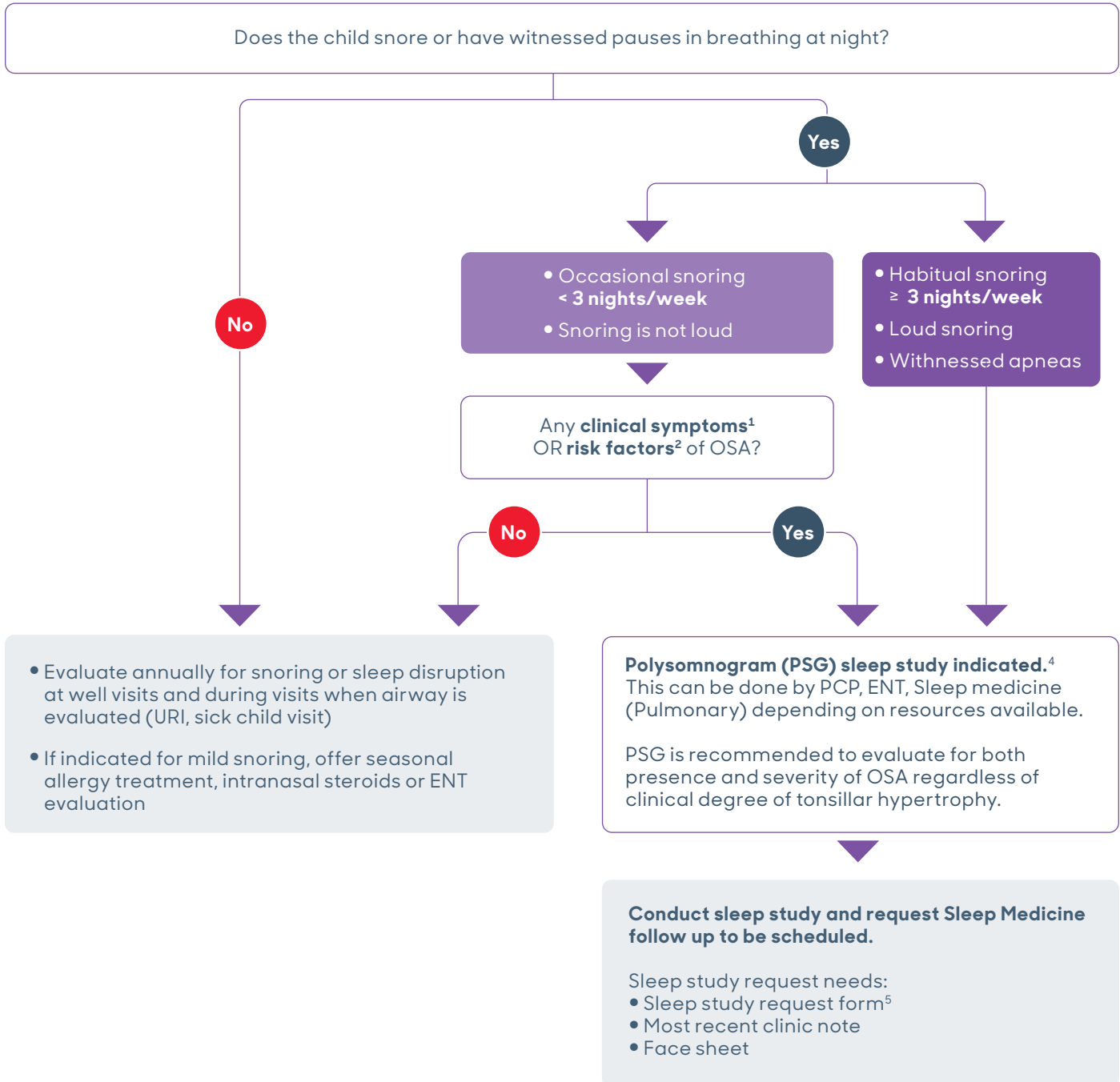


# Algorithm for Obstructive Sleep Apnea (OSA)

**Epidemiology:** Risk of OSA increases with obesity. 13–33% of all youth with obesity present with OSA. Screen all patients with obesity for OSA.

**Treatment goal:** Improve OSA so that patient has ability to sleep without any snoring or apneas at night.



#	Subject	Description				
1	Clinical symptoms	<p>It is crucial to take a focused sleep history when evaluating for OSA. These include both nighttime and daytime symptoms.</p> <ul style="list-style-type: none"> <li>• <b>Potential consequences</b> of OSA in childhood: ADHD or disruptive behavior disorders, poor growth, hypertension, altered cardiac morphology, pulmonary hypertension</li> </ul>				
		<table border="1"> <thead> <tr> <th>Nighttime symptoms:</th> <th>Daytime symptoms:</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>• <b>snoring</b></li> <li>• <b>labored breathing during sleep</b></li> <li>• paradoxical abdominal movements</li> <li>• apneas, pauses in breathing</li> <li>• mouth breathing</li> <li>• restless/agitated sleep</li> <li>• sleeping with neck extended</li> <li>• nighttime sweating</li> <li>• nocturia</li> <li>• sleep walking</li> <li>• sleep terrors</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>• mouth breathing</li> <li>• hyponasal speech</li> <li>• poor behavioral functioning (inattentiveness, difficulty learning, irritability)</li> <li>• hyperactivity (&gt;sleepiness in young children)</li> <li>• Sleepiness(&gt; in adolescence)</li> <li>• morning headache</li> <li>• teeth grinding (bruxism)</li> </ul> </td> </tr> </tbody> </table>	Nighttime symptoms:	Daytime symptoms:	<ul style="list-style-type: none"> <li>• <b>snoring</b></li> <li>• <b>labored breathing during sleep</b></li> <li>• paradoxical abdominal movements</li> <li>• apneas, pauses in breathing</li> <li>• mouth breathing</li> <li>• restless/agitated sleep</li> <li>• sleeping with neck extended</li> <li>• nighttime sweating</li> <li>• nocturia</li> <li>• sleep walking</li> <li>• sleep terrors</li> </ul>	<ul style="list-style-type: none"> <li>• mouth breathing</li> <li>• hyponasal speech</li> <li>• poor behavioral functioning (inattentiveness, difficulty learning, irritability)</li> <li>• hyperactivity (&gt;sleepiness in young children)</li> <li>• Sleepiness(&gt; in adolescence)</li> <li>• morning headache</li> <li>• teeth grinding (bruxism)</li> </ul>
		Nighttime symptoms:	Daytime symptoms:			
<ul style="list-style-type: none"> <li>• <b>snoring</b></li> <li>• <b>labored breathing during sleep</b></li> <li>• paradoxical abdominal movements</li> <li>• apneas, pauses in breathing</li> <li>• mouth breathing</li> <li>• restless/agitated sleep</li> <li>• sleeping with neck extended</li> <li>• nighttime sweating</li> <li>• nocturia</li> <li>• sleep walking</li> <li>• sleep terrors</li> </ul>	<ul style="list-style-type: none"> <li>• mouth breathing</li> <li>• hyponasal speech</li> <li>• poor behavioral functioning (inattentiveness, difficulty learning, irritability)</li> <li>• hyperactivity (&gt;sleepiness in young children)</li> <li>• Sleepiness(&gt; in adolescence)</li> <li>• morning headache</li> <li>• teeth grinding (bruxism)</li> </ul>					
<p><b>Bimodal Peak</b> of OSA in younger kids is related to adenotonsillar hypertrophy and older kids/teens with obesity.</p>						
2	Risk factors	<p>Major risk factors for OSA include <b>obesity, adenotonsillar hypertrophy</b> and <b>the male sex</b>. Other risk factors include environmental smoke exposure, asthma, allergic rhinitis, or other conditions that reduce upper airway size or affect neural control of the upper airway (i.e. trisomy 21, craniofacial syndromes, neuromuscular disorders, mucopolysaccharidoses). If patient presents with snoring and has an associated risk factor, a sleep study is recommended.</p>				
3	Physical exam	<p>Physical exam for patient suspected of OSA should include:</p> <ul style="list-style-type: none"> <li>• <b>Examination of the oropharynx and mouth</b> – evaluate for adenotonsillar hypertrophy, jaw structure (overbite), high-arched and narrow hard plate</li> <li>• <b>Plotting on growth chart</b> – poor growth can indicate chronic severe OSA</li> <li>• <b>Cardiopulmonary exam</b> – assess BP and cardiac auscultation to screen for pulmonary hypertension, a consequence of OSA in childhood</li> <li>• <b>Assess head and nose</b> – turbinate hypertrophy; screen for craniofacial abnormalities that may suggest abnormal upper airway anatomy (mouth breathing, long facies, decreased nasal flow, hyponasal speech are all consistent with adenoidal hypertrophy, which can lead to OSA)</li> </ul>				

**Sources:**

Children's National Hospital Sleep Medicine Department

Link to AAO-HNS CPG Tonsillectomy in Children (could include as a reference if you like):<https://journals.sagepub.com/doi/full/10.1177/0194599818801757>

American Academy of Sleep Medicine (AASM), International Classification of Sleep Disorders, Sateia, DOI: 10.1378/chest.14-0970

UpToDate, Evaluation of suspected obstructive sleep apnea in children, Paruthi, <https://www.uptodate.com/contents/evaluation-of-suspected-obstructive-sleep-apnea-in-children>

#	Subject	Description
4	Polysomnography (PSG)	<p><b>Overnight PSGs are used for definitive diagnosis of OSA.</b> They can identify obstructive events and quantify severity of OSA, including gas exchange abnormalities and sleep disruption (arousals associated with respiratory events). This can be done either by ENT, Sleep medicine specialist(Pulmonology) or PCP depending on resources available.</p> <p>Summary measures used for diagnosis of OSA include:</p> <ul style="list-style-type: none"> <li>• <b>Obstructive Apnea Hypopnea (OAH) Index</b> – average number of apneas plus hypopneas PER HOUR of sleep</li> <li>• <b>Oxygenation (SpO2)</b> – nadir SpO2 and percent of time SpO2 is &lt; 90% out of total sleep time evaluates for hypoxemia associated with obstructions during sleep</li> <li>• <b>Hypoventilation</b> – end-tidal or transcutaneous CO2 &gt; 50mmHg that persists for more than 25% of the total sleep time</li> <li>• Diagnosis and management should be recommended based on the results of the PSG.</li> </ul>
5	Sleep study request form	<p>Attached on the next page is a copy of the Children’s National Medical Center Sleep Study Request Form for a PSG.</p> <ul style="list-style-type: none"> <li>• The request form has been pre-completed at the bottom to select elective PSG with referring physician and <b>PCP follow-up</b>, who are expected to relay results and create a treatment plan with the patient. This should be adequate for a primary care setting for diagnosis and management of OSA. If the ordering provider would like the Sleep Clinic to manage the patient after PSG is completed, then a separate appointment request has to be made to schedule a new patient visit within 1 month after PSG is completed.</li> </ul> <p><b>NOTE:</b> Checking the box on the PSG order form for a Sleep Clinic follow-up <b>WILL NOT</b> automatically schedule the patient for a new patient visit in Sleep Clinic.</p> <p>In addition to filling the request form out, the most recent <b>clinic note</b> AND <b>face sheet</b> should be included.</p>

