Journal Scan

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Endothelial repair capacity and apoptosis are inversely related in obstructive sleep apnea.

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PURPOSE: To investigate the impact of obstructive sleep apnea (OSA) on endothelial repair capacity and apoptosis in the absence of potentially confounding factors including obesity.

PATIENTS AND METHODS: Sixteen patients with a body mass index <30 and newly diagnosed OSA and 16 controls were studied. Circulating levels of endothelial progenitor cells, a marker of endothelial repair capacity, and endothelial microparticles, a marker of endothelial apoptosis, were quantified before and after four-week therapy with continuous positive airway pressure (CPAP). Endothelial cell apoptotic rate was also quantified in freshly harvested venous endothelial cells. Vascular reactivity was measured by flow-mediated dilation.

RESULTS: Before treatment, endothelial microparticle levels were greater and endothelial progenitor cell levels were lower in patients with OSA than in controls ($P < 0.001$ for both). Levels of endothelial microparticles and progenitors cells were inversely related ($r = -0.67$, $P < 0.001$). Endothelial progenitor cell levels increased after effective treatment ($P = 0.036$).

CONCLUSIONS: In the absence of any co-morbid conditions including obesity, OSA alone impairs endothelial repair capacity and promotes endothelial apoptosis. These early endothelial alterations may underlie accelerated atherosclerosis and increased cardiovascular risk in OSA.

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Obstructive sleep apnea and stroke.

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Obstructive sleep apnea (OSA) and stroke are frequent, multifactorial entities that share risk factors, and for which case-control and cross-sectional studies have shown a strong association. Stroke of respiratory centers can lead to apnea. Snoring preceding stroke, documentation of apneas immediately prior to transient ischemic attacks, the results of autonomic studies, and the circadian pattern of stroke, suggest that untreated OSA can contribute to stroke. Although cohort studies indicate that OSA is a stroke risk factor, controversy surrounds the cost-effectiveness of the screening for and treatment of OSA once stroke has occurred.

J Clin Sleep Med. 2009 Apr 15; 5(2):151-3.

Development of central sleep apnea after maxillofacial surgery for obstructive sleep apnea.

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Central sleep apnea is a rarely reported complication of surgery for obstructive sleep apnea (OSA). We report the case of a 38-year-old male who developed marked central sleep apnea 3 months after a maxillomandibular advancement for moderate OSA, which spontaneously resolved on his 6-month postoperative polysomnogram. Five prior cases of this postoperative complication have been reported in nonobese individuals after tracheostomy for OSA. Additionally, a recent study demonstrated that patients with atmospheric pharyngeal closing pressures are susceptible to unstable ventilation. We hypothesize that latent high loop gain from chronic OSA, coupled with atmospheric pharyngeal closing pressures, predisposed our patient to develop unstable ventilation after an abrupt postoperative change in his ventilatory load. Our case supports delaying postoperative polysomnography > or = 6 months in individuals at high risk for this complication.

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Treatment of sleep disorders after traumatic brain injury.

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STUDY OBJECTIVES: Determine whether treatment of sleep disorders identified in brain injured adults would result in resolution of those sleep disorders and improvement of symptoms and daytime function.

METHODS: Prospective evaluation of unselected traumatic brain injury patients with nocturnal polysomnography (NPSG), multiple sleep latency test (MSLT), Epworth Sleepiness Scale (ESS), and neuropsychological testing including Psychomotor Vigilance Test (PVT), Profile of Mood States (POMS), and Functional Outcome of Sleep Questionnaire (FOSQ) before and after treatment with continuous positive airway pressure (CPAP) for obstructive sleep apnea (OSA), modafinil (200 mg) for narcolepsy and posttraumatic hypersomnia (PTH), or pramipexole (0.375 mg) for periodic limb movements in sleep (PLMS).

SETTING: Three academic medical centers.

PARTICIPANTS: Fifty-seven (57) adults > or = 3 months post traumatic brain injury (TBI).

MEASUREMENTS AND RESULTS: Abnormal sleep studies were found in 22 subjects (39%), of whom 13 (23%) had OSA, 2 (3%) had PTH, 3 (5%) had narcolepsy, 4 (7%) had PLMS, and 12 had objective excessive daytime sleepiness with MSLT score < 10 minutes. Apneas, hypopneas, and snoring were eliminated by CPAP in OSA subjects, but there was no significant change in MSLT scores. Periodic limb movements were eliminated with pramipexole. One of 3 narcolepsy subjects and 1 of 2 PTH subjects had resolution of hypersomnia with modafinil. There was no significant change in FOSQ, POMS, or PVT results after treatment.

CONCLUSIONS: Treatment of sleep disorders after TBI may result in polysomnographic resolution without change in sleepiness or neuropsychological function.

J Clin Sleep Med. 2009 Oct 15; 5(5):431-8.

The tongue-retaining device: efficacy and side effects in obstructive sleep apnea syndrome.

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STUDY OBJECTIVES: The tongue-retaining device is a customized monobloc oral appliance used in the treatment of obstructive sleep apnea syndrome (OSAS). This study evaluated tongue-retaining device efficacy and its tolerance by patients with OSAS.

METHODS: The charts of 84 apneic patients were retrospectively analyzed, and patients were contacted by telephone to answer an oral questionnaire. The median follow-up time was 5 years.

RESULTS: Based on the apnea-hypopnea index, a complete or partial response was obtained in 71% of the cases. The mean apnea-hypopnea index decreased significantly from 38 to 14 ($p < 0.001$) with the tongue-retaining device. The subjective intensity of snoring decreased by 68% ($p < 0.0001$) and the Epworth Sleepiness Scale score decreased from 9 to 6 ($p < 0.05$). An age of more than 60 years associated with a mandibular protrusion distance inferior or equal to 7 mm was predictive of a nonresponse (odds ratio [OR]: 7.25; 95% confidence interval [CI]: 1.43-36.7; $p < 0.02$). The compliance rate, as determined by answers to the questionnaire, was 52% after 5 years of follow-up. Nasal obstruction was a negative predictor of good compliance (OR: 6.94; 95% CI: 0.28-0.79; $p < 0.005$), whereas patients with Class I occlusion were more compliant than patients with Class II or III occlusions (OR: 3.83; 95% CI: 1.00-2.81; $p < 0.05$).

CONCLUSIONS: Tongue-retaining device performance tended to be similar to that of the mandibular advancement device. Thus, teams trained in tongue-retaining device fabrication and fitting may propose it as an alternative to continuous positive airway pressure, taking nasal obstruction into consideration as a contraindication.

J Clin Sleep Med. 2009 Oct 15; 5(5):428-30.

Poor long-term patient compliance with the tennis ball technique for treating positional obstructive sleep apnea.

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STUDY OBJECTIVES: Little is known regarding long-term patient compliance with the tennis ball technique (TBT), one of the original simple methods of positional therapy (i.e., avoiding the supine posture during sleep) for posture-dependent obstructive sleep apnea patients. The purpose of this study was to investigate long-term patient compliance with TBT.

METHODS: A follow-up questionnaire was mailed to all patients prescribed TBT at the Adelaide Institute for Sleep Health between July 2004 and March 2008 (n = 108).

RESULTS: Sixty-seven patients replied to the questionnaire. Baseline demographic/clinical characteristics were not significantly different from non-respondents. Among the respondents, follow-up time was (mean +/- SD) 2.5 +/- 1.0 years. Four (6.0%) reported they were still using TBT (group A); 9 (13.4%) were no longer using TBT, claiming to have learned to avoid the supine position during sleep (group B); and 54 (80.6%) were neither using TBT nor avoiding the supine posture (group C). The main reason for ceasing TBT use in group C was that TBT was too uncomfortable (34/54 patients).

CONCLUSIONS: Long-term patient compliance with TBT appears to be very poor, with less than 10% of patients reporting continued use (group A) approximately 30 months after prescription. With most TBT non-compliers reporting it to be too uncomfortable, alternative forms of positional therapy appear to be needed.

J Clin Sleep Med. 2009 Oct 15; 5(5):422-7.

Effects of heated humidification and topical steroids on compliance, nasal symptoms, and quality of life in patients with obstructive sleep apnea syndrome using nasal continuous positive airway pressure.

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BACKGROUND: Nasal side effects are common in patients with obstructive sleep apnea syndrome (OSAS) starting on nasal continuous positive airway pressure (CPAP) therapy. We tested the hypothesis that heated humidification or nasal topical steroids improve compliance, nasal side effects and quality of life in this patient group.

METHODS: 125 patients with the established diagnosis of OSAS (apnea/hypopnea index > or = 10/h), who tolerated CPAP via a nasal mask, and who had a successful CPAP titration were randomized to 4 weeks of dry CPAP, humidified CPAP or CPAP with additional

topical nasal steroid application (fluticasone, GlaxoWellcome). Groups were similar in all demographic variables and in frequency of nasal symptoms at baseline. Outcome measures were objective compliance, quality of life (short form 36), subjective sleepiness (Epworth Sleepiness Scale score) and nasal symptoms such as runny, dry or blocked nose, sneezing and headaches; all variables assessed using a validated questionnaire and by direct interview.

RESULTS: There was no difference in compliance between groups after 4 weeks (dry: 5.21 +/- 1.66 h/night, fluticasone: 5.66 +/- 1.68, humidifier: 5.21 +/- 1.84; p = 0.444). Quality of life and subjective sleepiness improved in all groups, but there were no differences in the extent of improvement. Nasal Symptoms were less frequently reported in the humidifier group (28%) than in the remaining groups (dry: 70%, fluticasone: 53%, p = 0.002). However, the addition of fluticasone resulted in increased frequency of sneezing.

CONCLUSION: The addition of a humidifier, but not nasal steroids decreases the frequency of nasal symptoms in unselected OSAS patients initiating CPAP therapy; however compliance and quality of life remain unaltered.

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The prevalence and natural history of complex sleep apnea.

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RATIONALE: Central sleep apnea (CSA) may occasionally occur in patients with obstructive sleep apnea during titration with a continuous positive airway pressure (CPAP) device.

OBJECTIVES: To determine the prevalence and the natural history of CPAP-emergent CSA.

METHODS: This is a retrospective study of 1286 patients with a diagnosis of OSAwho underwent titration with a positive airway device during a 1-year period. Patients were seen in consultation and underwent full-night attended polysomnography followed by full-night attended CPAP titration. Four weeks after CPAP therapy, patients returned to the clinic for follow-up, and objective adherence to CPAP was recorded. In patients who had CSA on CPAP, a second full-night attended CPAP titration was recommended.

RESULTS: Eighty-four of the 1286 patients developed a central apnea index (CAI) of 5 or greater per hour while on CPAP. The incidence of CSA varied from 3% to 10% monthly, with an overall incidence of 6.5%. Forty-two of the 84 patients returned for a second CPAP titration. In 33 patients, CSA was eliminated. In each of the remaining 9 patients, the CAI remained at 5 or greater per hour, with an average of 13 per hour. These patients characteristically had the most severe OSA, and 5 had a CAI of 5 or more per hour at baseline. Two of the 9 patients were on opioids.

CONCLUSIONS: In this large retrospective study of 1286 patients with a diagnosis of OSA, 6.5% had CPAP-emergent or persistent CSA. However, CPAP-emergent CSA was generally transitory and was eliminated within 8 weeks after CPAP therapy. The prevalence of CPAP-persistent CSA was about 1.5%. Severity of OSA, a CAI of 5 or greater per hour, and use of opioids were potential risk factors.

BMJ. 2009 Dec 3; 339:b4609. doi: 10.1136/bmj.b4609.

Effect of a very low energy diet on moderate and severe obstructive sleep apnoea in obese men: a randomised controlled trial.

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OBJECTIVE: To assess the effect of weight loss induced by a very low energy diet on moderate and severe obstructive sleep apnoea in obese men. Design Single centre, two arm, parallel, randomised, controlled, open label trial. Blocked randomisation procedure used for treatment allocation. Setting Outpatient obesity clinic in a university hospital in Stockholm, Sweden. Participants 63 obese men (body mass index 30-40, age 30-65 years) with moderate to severe obstructive sleep apnoea (apnoea-hypopnoea index (AHI) >or=15), treated with continuous positive airway pressure.

INTERVENTIONS: The intervention group received a liquid very low energy diet (2.3 MJ/day) for seven weeks to promote weight loss, followed by two weeks of gradual introduction of normal food, reaching 6.3 MJ/day at week 9. The control group adhered to their usual diet during the nine weeks of follow-up.

MAIN OUTCOME MEASURE: AHI, the major disease severity index for obstructive sleep apnoea. Data from all randomised patients were included in an intention to treat analysis (baseline carried forward for missing data). Results Of the 63 eligible patients, 30 were randomised to intervention and 33 to control. Two patients in the control group were dissatisfied with allocation and immediately discontinued. All other patients completed the trial. Both groups had a mean AHI of 37 events/h (SD 15) at baseline. At week 9, the intervention group's mean body weight was 20 kg (95% confidence interval 18 to 21) lower than that of the control group, while its mean AHI was 23 events/h (15 to 30) lower. In the intervention group, five of 30 (17%) were disease free after the energy restricted diet (AHI <5), with 15 of 30 (50%) having mild disease (AHI 5-14.9), whereas the AHI of all patients in the control group except one remained at 15 or higher. In a subgroup analysis of the intervention group, baseline AHI significantly modified the effectiveness of treatment, with a greater improvement in AHI in patients with severe obstructive sleep apnoea (AHI >30) at baseline compared with those with moderate (AHI 15-30) sleep apnoea (AHI -38 v -12, P<0.001), despite similar weight loss (-19.2 v -18.2 kg, P=0.55). Conclusion Treatment with a low energy diet improved obstructive sleep apnoea in obese men, with the greatest effect in patients with severe disease. Long term treatment studies are needed to validate weight loss as a primary treatment strategy for obstructive sleep apnoea.

TRIAL REGISTRATION: Current Controlled Trials ISRCTN70090382.

Prim Care Companion J Clin Psychiatry. 2009; 11(5):197-204.

Recognition and management of excessive sleepiness in the primary care setting.

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BACKGROUND: Excessive sleepiness often goes unrecognized in the primary care setting despite its high prevalence and deleterious effects on both individual and public safety. Patients with neurologic and psychiatric illnesses, as well as those with acute and chronic medical conditions, plus those with sleep disorders, often have symptoms of excessive sleepiness, tiredness, and fatigue. Recognition and prompt treatment of these symptoms are important, even though their etiology may not be immediately understood. This review focuses on the underlying causes, consequences, identification, and treatment of excessive sleepiness.

DATA SOURCES: A search of the literature to 2007 was performed using the PubMed search engine. English-language articles were identified using the following search terms: excessive sleepiness, fatigue, circadian rhythm, obstructive sleep apnea, shift work disorder, narcolepsy, drowsy driving, and wakefulness. Additional references were identified through bibliography reviews of relevant articles.

DATA SYNTHESIS: Current assessments of the prevalence, consequences, and etiologies of excessive sleepiness, with leading treatment strategies, were extracted, reviewed, and summarized to meet the objectives of this article.

CONCLUSIONS: Excessive sleepiness is associated with a wide range of medical, neurologic, and psychiatric disorders frequently seen in primary care practice.

Excessive sleepiness is a serious, debilitating, potentially life-threatening condition, yet also treatable, and it is important to initiate appropriate intervention as early as possible. Physicians should place increasing emphasis on the substantial benefits that accompany improvements in wakefulness.

COPD. 2009 Dec; 6(6):441-5.

Hyperinflation is associated with lower sleep efficiency in COPD with co-existent obstructive sleep apnea.

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Prior research has shown that individuals with obstructive lung disease are at risk for sleep fragmentation and poor sleep quality. We postulated that patients with chronic obstructive pulmonary disease (COPD) and obstructive sleep apnea (known as overlap syndrome) who have more severe lung disease, as measured by lung hyperinflation (inspiratory capacity/total lung capacity), would have greater sleep disturbances independent of traditional measures of sleep apnea. We performed a retrospective chart review of consecutive patients evaluated and treated in an academic pulmonary clinic for overlap syndrome. Pulmonary function tests and polysomnogram data were collected. Thirty patients with overlap syndrome were included in the analysis. We found significant univariable associations between sleep efficiency and apnea/hypopnea index (beta = -0.285, p = 0.01) and between sleep efficiency and lung hyperinflation (beta = 0.654, p = 0.03). Using multivariable linear regression, the relationship between sleep efficiency and lung hyperinflation remained significant (beta = 1.13, p = 0.02) after adjusting for age, sex, body mass index, apnea/hypopnea index, FEV(1)% predicted, oxygen saturation nadir, medications, and cardiac disease. We conclude that increased severity of hyperinflation is associated with worse sleep efficiency, independent of apnea and nocturnal hypoxemia. The mechanisms underlying this observation are uncertain. We speculate that therapies aimed at reducing lung hyperinflation may improve sleep quality in patients with overlap syndrome.

Curr Treat Options Cardiovasc Med. 2009 Dec; 11(6):447-54.

Obstructive sleep apnea and heart failure.

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Obstructive sleep apnea (OSA) exerts several effects that may be particularly deleterious in patients with heart failure (HF). OSA should be considered especially in HF patients who are obese or have the metabolic syndrome, systemic hypertension, or pulmonary hypertension. HF patients in whom OSA is suspected should undergo a full evaluation by a sleep specialist, including a polysomnogram, to diagnose OSA and differentiate this disease from central sleep apnea. Those found to have OSA should then receive continuous positive airway pressure and/or other interventions, and standard disease management strategies should be used to maximize compliance. Those who cannot tolerate continuous positive airway pressure may be candidates for mandibular advancement devices or surgical therapies including tracheostomy. Standard HF medications should be used to treat HF, and optimization of fluid balance may help minimize OSA severity. However, it is still unknown whether treatment of OSA in HF patients will reduce hospitalizations or mortality.

Sleep. 2009 Nov 1;32(11):1521-7.

Thermal infrared imaging: a novel method to monitor airflow during polysomnography.

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STUDY OBJECTIVES: This is a feasibility study designed to evaluate the accuracy of thermal infrared imaging (TIRI) as a noncontact method to monitor airflow during polysomnography and to ascertain the chance-corrected agreement (K) between TIRI and conventional airflow channels (nasal pressure [Pn], oronasal thermistor and expired CO2 [P(E)CO2]) in the detection of apnea and hypopnea.

DESIGN: Subjects were recruited to undergo polysomnography for 1 to 2 hours, during which simultaneous recordings from electroencephalography, electrooculography, electromyography, respiratory impedance plethysmography, conventional airflow channels, and TIRI were obtained.

SETTING: University-affiliated, American Academy of Sleep Medicine-accredited sleep disorders center.

PATIENTS OR PARTICIPANTS: Fourteen volunteers without a history of sleep disordered breathing and 13 patients with a history of obstructive sleep apnea were recruited.

MEASUREMENTS AND RESULTS: In the detection of apnea and hypopnea, excellent agreement was noted between TIRI and thermistor (kappa = 0.92, Bayesian Credible Interval [BCI] 0.86, 0.96; pkappa = 0.99). Good agreement was noted between TIRI and Pn (kappa = 0.83, BCI 0.70, 0.90; pkappa = 0.98) and between TIRI and P(E)CO2 (kappa = 0.80, BCI 0.66, 0.89; pkappa = 0.94).

CONCLUSIONS: TIRI is a feasible noncontact technology to monitor airflow during polysomnography. In its current methodologic incarnation, it demonstrates a high degree of chance-corrected agreement with the oronasal thermistor in the detection of apnea and hypopneas but demonstrates a lesser degree of chance-corrected agreement with Pn. Further overnight validation studies must be performed to evaluate its potential in clinical sleep medicine.

Pediatr Pulmonol. 2009 Dec;44(12):1186-91.

Pediatric obstructive sleep apnea: a potential late consequence of respiratory syncitial virus bronchiolitis.

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STUDY OBJECTIVES: To examine the hypothesis that children who suffered from severe respiratory syncitial virus (RSV) bronchiolitis during infancy may be at higher risk for obstructive sleep apnea (OSA) later in childhood.

METHODS: Survey of Kosair Children's Hospital medical records allowed for identification of potential candidates for the study. Twenty-one randomly selected children (mean age +/- SD: 5.2 +/- 1.5 years) with a history of verified RSV-induced bronchiolitis during their first year of life underwent overnight sleep study (NPSG). Children recruited from the general population with no history of RSV bronchiolitis served as a control group. After matching for age, gender, ethnicity, gestational age at birth, body mass index (BMI) z scores, household cigarette smoking, history of asthma and allergies, 63 control subjects (mean age +/- SD: 5.1 +/- 0.7 years) were also studied.

RESULTS: Children who had RSV bronchiolitis as infants had significantly higher obstructive apnea/hypopnea index compared to controls (2.3 +/- 1.9 vs. 0.6 +/- 0.8 / hr total sleep time (TST); $P < 0.05$). In addition, significantly higher respiratory arousal indices were apparent among children with previous RSV bronchiolitis compared to controls (1.3 +/- 1.0 vs. 0.1 +/- 0.2 /hr TST; $P < 0.05$). There were no significant differences between the groups in the lowest SpO(2), ETCO(2), and sleep indices.

CONCLUSIONS: RSV bronchiolitis may contribute to the pathophysiology of OSA in vulnerable children.

Cleve Clin J Med. 2009 Nov;76 Suppl 4:S98-103.

Perioperative management of obstructive sleep apnea: ready for prime time?

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Obstructive sleep apnea (OSA) is associated with increased risks of cardiovascular disease and stroke and with elevated rates of postoperative complications (including cardiac ischemia and respiratory failure) in surgical patients. Additionally, the prevalence of OSA is higher in surgical patients than in the general population.

Screening for OSA prior to surgery is recommended to identify patients at risk for postoperative complications. The presence of moderate or severe OSA calls for modified strategies of perioperative anesthesia, pain management, and postoperative monitoring to reduce the chance of OSA-associated complications.

Sleep Breath. 2009 Oct 29.

Nocturia and snoring: predictive symptoms for obstructive sleep apnea.

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PURPOSE: Current screening for obstructive sleep apnea (OSA) emphasizes self-reported snoring and other breathing symptoms. Nocturia, a symptom with a precise pathophysiological link to sleep apnea, has not been assessed as a screening tool for this common disorder of sleep respiration. In a large sample of adults presenting to area sleep centers, we aimed to determine the predictive power of nocturia for OSA and compare findings with other markers of OSA commonly used to screen for this disease.

METHODS: This was a retrospective chart review. A consecutive sample of 1,007 adult patients seeking treatment at two sleep centers in New Mexico completed detailed medical and sleep history questionnaires and completed diagnostic polysomnography testing. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of nocturia,snoring, high body mass index, sex, and age for OSA were determined. Hierarchical linear regression determined unique variance contribution to the apnea-hypopnea index, the objective measure of sleep apnea severity.

RESULTS: The results are as follows: sensitivities-snoring, 82.6% and nocturia, 84.8%; specificities-snoring, 43.0% and nocturia, 22.4%; PPVs-snoring, 84.7% and nocturia, 80.6%; and NPVs-snoring, 39.6% and nocturia, 27.9%. With hierarchical linear regression,patient-reported nocturia frequency predicted apnea -hypopnea index (OSA severity) above and beyond body mass index, sex, age, and self-reported snoring ($P < 0.0001$).

CONCLUSIONS: Nocturia appears comparable to snoring as a screening tool for OSA in patients presenting to a sleep medical center. Research in urology and primary care clinics is needed to definitively clarify the use of nocturia as a screening instrument for obstructive sleep apnea.

Intern Med J. 2009 Oct 22.

Obstructive sleep apnoea - an update.

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ABSTRACT METHOD: Observations were made on forty adults with lifelong multiple disabilities, in whom Percutaneous Endoscopic Gastrostomy (PEG) feeding was initiated during 1990 - 2008.

RESULTS: There were 20 males and 20 females aged 15-40 at the time of the audit, living in settings with 24 hour Registered Nurse staffing. All had quadriplegia, and Severe-Profound Intellectual Disability at the time of initiation of PEG feeding; 28 had active epilepsy. Undernutrition and recurrent aspiration with frequent infections were cited as reasons for PEG feeding. The positive outcomes were that these residents of supported accommodation lived with PEG feeding for an average of 8.5 years, some up to 18 years. In that time, however, they all experienced complications of the PEG insertion, and of the PEG feeding process. Some underweight people gained some weight, only one achieved a normal Body Mass Index. Although some were said to be more alert for a time following the procedure, there were no measurable improvements in cognition. There were no reductions in prescription of medications. They all required frequent daily interventions by nurses to maintain medical stability. Ten people died during this review period, from continued deterioration in neurological status, with pneumonia cited as the terminal event.

CONCLUSIONS: This study adds information for families and clinicians faced with the need to optimally balance the benefits and risks of possibly very long term artificial nutritional support in people with multiple profound disabilities.