Canadian Thoracic Society guidelines: Diagnosis and treatment of sleep disordered breathing in adults

John Fleetham MD, Najib Ayas MD, Doug Bradley MD, Kathy Ferguson MD, Michael Fitzpatrick MD, Charlie George MD, Patrick Hanly MD, Fran Hill RT, John Kimoff MD, Meir Kryger MD, Debra Morrison MD, Frederic Series MD, Willis Tsai MD; the CTS Sleep Disordered Breathing Committee

The Canadian Thoracic Society (CTS) guidelines for the diagnosis and treatment of sleep disordered breathing in adults were developed over the past year. A one-day meeting was held in Montreal, Quebec, on October 28, 2005, just before the annual CTS meeting.The meeting was facilitated by Dr R Davies (Oxford, United Kingdom), and speakers included D Morrison (Halifax, Nova Scotia), J Kimoff (Montreal), J Fleetham (Vancouver, British Columbia), C George (London, Ontario), M Kryger (Winnipeg, Manitoba), P Hanly (Calgary, Alberta), F Hill (Saskatoon, Saskatchewan), D Bradley (Toronto, Ontario), N Ayas (Vancouver), M Fitzpatrick (Kingston, Ontario), F Series (Quebec City, Quebec), K Ferguson (London) and W Tsai (Calgary). This meeting was attended by 28 Canadian physicians with an interest in sleep disordered breathing. A draft of an Executive Summary was developed, and then reviewed and finalized by the CTS Sleep Disordered Breathing Committee at a one-day meeting in Toronto on February 17, 2006. The Committee members then individually ranked the level of evidence as: grade A – high-quality meta-analysis or single randomized clinical trial (RCT) that had a low risk of bias; grade B – high-quality systematic review of cohort studies or single cohort study with a low risk of bias or extrapolated evidence from high-quality RCTs or RCTs with a risk of bias; grade C – case-control studies or cohort studies with a risk of bias; or grade D – case series, case reports or expert opinion. The Committee members also ranked their agreement with each statement (strongly agree, agree, neutral, disagree or strongly disagree). No statement was included unless at least 90% of the Committee either strongly agreed or agreed with it.

I. CLINICAL SYNDROMES AND SEVERITY DEFINITIONS

Sleep disordered breathing (SDB) consists of three distinct clinical syndromes, namely, obstructive sleep apnea-hypopnea syndrome (OSAHS), central sleep apnea-hypopnea syndrome (CSAHS) including Cheyne-Stokes breathing syndrome (CSBS), and sleep hypoventilation syndrome (SHVS). Each syndrome has diagnostic criteria.

OSAHS

Diagnostic criteria: The individual must fulfill criterion A or B, plus criterion C (level of evidence D).

A. Excessive daytime sleepiness that is not better explained by other factors.

B. Two or more of the following that are not better explained by other factors:

1. Choking or gasping during sleep;
2. Recurrent awakenings from sleep;
3. Unrefreshing sleep;
4. Daytime fatigue; and
5. Impaired concentration.

C. Sleep monitoring demonstrates five or more obstructive apneas/hypopneas per hour during sleep.

Obstructive apnea/hypopnea event: An event characterized by complete cessation of, or a transient reduction in, breathing with maintained or increasing respiratory effort. In routine clinical practice, it is not considered necessary to distinguish obstructive hypopneas from apneas because both types of events have similar pathophysiology. These events must fulfill criterion A or B, plus criterion C (level of evidence D).

A. A clear decrease (greater than 50%) from baseline in the amplitude of nasal pressure or respiratory inductance plethysmography sum tracing. Baseline is defined as the mean amplitude of stable breathing and oxygenation in the 2 min preceding onset of the event (in individuals who have a stable breathing pattern during sleep), or the mean amplitude of the three largest breaths in the 2 min preceding onset of the event (in individuals with an unstable breathing pattern).

B. A clear amplitude reduction of a validated measure of breathing during sleep that does not reach the above

CTS Sleep Disordered Breathing Committee
Correspondence: Dr John Fleetham, Respiratory Medicine, 7th Floor, Diamond Health Care Centre, 2775 Laurel Street,Vancouver, British Columbia V5Z 1M9. Telephone 604-875-5653, fax 604-875-5587, e-mail John.Fleetham@vch.ca

criterion but is associated with an oxygen desaturation of 4% or greater, or an arousal.

C. The event lasts 10 s or longer.

At the present time, there is no clear consensus within the field of SDB on the definition of hypopnea; it has also been defined as an abnormal respiratory event lasting at least 10 s with at least a 30% reduction in thoracoabdominal movement or airflow, as compared with baseline, and with at least a 4% desaturation. Polysomnogram reports should clearly indicate which definition of hypopnea the report is based on and ideally should report hypopneas based on both definitions. The severity criteria listed below are based on the first definition of hypopnea, which does not necessarily require a 4% or greater oxygen desaturation. (Level of evidence D)

Severity criteria: The severity of OSAHS has two components: severity of daytime sleepiness and severity of overnight monitoring. A severity level should be specified for both components. The severity rating for the syndrome should be based on the most severe component.

A. Sleepiness (level of evidence D)

1. Mild: Unwanted sleepiness or involuntary sleep episodes occur during activities that require little attention. Examples include sleepiness that is likely to occur while watching television, reading, or travelling as a passenger.
2. Moderate: Unwanted sleepiness or involuntary sleep episodes occur during activities that require some attention. Examples include uncontrollable sleepiness that is likely to occur while attending activities such as concerts, meetings or presentations.
3. Severe: Unwanted sleepiness or involuntary sleep episodes occur during activities that require more active attention. Examples include uncontrollable sleepiness while eating, having a conversation, walking or driving.

B. Apnea/hypopnea index (level of evidence B)

1. Mild: Five to 15 events per hour
2. Moderate: 15 to 30 events per hour
3. Severe: Greater than 30 events per hour

CSAHS/CSBS

This syndrome includes idiopathic (primary) central sleep apnea, central sleep apnea-hypopnea due to CSBS, high altitude periodic breathing, and central sleep apnea-hypopnea due to drug or substance abuse. The latter two disorders are diagnosed in the appropriate setting and are not described further.

a) CSAHS

Diagnostic criteria: The individual must fulfill criteria A, B, C and D (level of evidence D).

A. At least one of the following symptoms that is not explained by other factors:

1. Excessive daytime sleepiness or fatigue; and
2. Frequent nocturnal awakenings.

B. Sleep monitoring demonstrates five or more central apnea/hypopneas per hour of sleep.

C. Normocapnia while awake (arterial partial pressure of carbon dioxide [$PaCO_2$] of 35 mmHg to 45 mmHg).

D. Not explained by the presence of a medical disorder, medication or substance abuse.

Central apnea/hypopnea event: An event characterized by absent or reduced tidal volume with absent or reduced thoracoabdominal movement, respectively. These events must fulfill criteria A and B (level of evidence D).

A. A clear decrease (greater than 50%) from baseline in the amplitude of nasal pressure or respiratory inductance plethysmography (see definition of baseline in the previous OSAHS section) with proportional reductions in ribcage and abdominal movements.

B. The event lasts 10 s or longer.

Severity criteria: There is insufficient evidence to provide criteria for rating severity.

b) CSBS

Diagnostic criteria: The individual must fulfill criteria A and B (level of evidence D).

A. Presence of a serious medical illness, such as a cardiac or neurological disease.

B. Sleep monitoring demonstrates the following:

1. Five or more central sleep apneas or hypopneas per hour of sleep; and
2. The presence of a cyclical crescendo and decrescendo change in breathing amplitude that may or may not be associated with arousals from sleep.

Severity criteria: There is insufficient evidence to provide criteria for rating severity.

SHVS

Diagnostic criteria: The individual must fulfill criteria A and B (level of evidence D).

A. One or more of the following:

1. Right heart failure;
2. Pulmonary hypertension;
3. Excessive daytime sleepiness that is not explained by other factors;
4. Erythrocytosis; and
5. Hypercapnia during wakefulness ($PaCO_2$ greater than 45 mmHg).

B. Sleep monitoring demonstrates one or both of the following:

1. An increase in $PaCO_2$ during sleep greater than 10 mmHg from awake supine values;
2. Sustained hypoxemia (arterial oxygen saturation

[SaO_2] less than 90%) during sleep not related to apnea or hypopnea.

Severity criteria: SHVS is described as severe if at least one of criteria A, B or C are fulfilled (level of evidence D).

A. Awake hypoxemia (partial pressure of oxygen [PaO_2] less than 60 mmHg or SaO_2 less than 90%).

B. SaO_2 less than 85% for more than 50% of the sleep time.

C. Right heart failure, biventricular failure or pulmonary hypertension secondary to SHVS.

II. REFERRAL

A. All patients who have suspected SDB should complete an assessment of daytime sleepiness such as the Epworth sleepiness scale (ESS) questionnaire to subjectively assess the degree of pretreatment sleepiness (level of evidence D).

B. Patient referrals for assessment of SDB should be physician generated and should provide sufficient information to be able to determine the urgency of assessment (level of evidence D).

C. Patients referred for medical specialist assessment and/or polysomnography should be triaged by the categories and criteria listed below (level of evidence D).

Priority 1 (urgent)

Patients with:

- Suspected SDB; and
- Major daytime sleepiness (ESS of 15 or greater); and a
- Safety critical occupation.

Or patients with:

- Suspected SDB; and
- One or more of the following:
  - Comorbid disease; or
  - Overnight home oximetry that reveals greater than 30 oxygen desaturations (4% or greater) per hour.

Priority 2

Patients with:

- Suspected SDB; and
- Major daytime sleepiness (ESS of 15 or greater); but
- Without a safety critical occupation.

Priority 3

Patients with:

- Suspected SDB; but without the following:
  - Major daytime sleepiness (ie, ESS of 15 or greater);
  - Comorbid diseases; or a
  - Safety critical occupation.

Comorbid disease/pregnancy: Ischemic heart disease, cerebrovascular disease, congestive heart failure, refractory systemic hypertension, obstructive/restrictive lung disease, pulmonary hypertension or hypercapnic respiratory failure, or pregnancy.

Safety critical occupations or at high risk for a motor vehicle collision: Individuals working with machinery, or employed in hazardous occupations; truck, taxi or bus drivers; railway engineers, airline pilots, air traffic controllers, aircraft mechanics, ship captains and pilots; and car drivers who admit to have fallen asleep while driving within the past two years. (All patients who are considered to be in a safety critical occupation should be told to cease their occupation and/or personal driving until after their medical assessment has been completed and/or appropriate treatment has been established.)

Waiting times: Medical specialist assessment and/or polysomnography should be arranged and completed by the following times after referral (level of evidence D):

- Priority 1 (urgent) cases – within two to four weeks;
- Priority 2 cases – within two months; and
- Priority 3 cases – within six months.

III. DIAGNOSIS

A. Level I (complete laboratory polysomnography) remains the accepted standard for evaluation of SDB and is the test of choice (level of evidence C).

B. Level II (full ambulatory polysomnography) and level III portable monitoring (multichannel cardiorespiratory recording devices) play a useful role in improving access to the diagnosis of SDB (level of evidence C).

C. Level II and III studies can be used to confirm the diagnosis of OSAHS in patients with a moderate to high pretest probability of this disorder, but are of more limited use in patients with comorbid disease and for the diagnosis of other forms of SDB (level of evidence C).

D. Studies using oximetry alone may have a role in the initial assessment of SDB, however, their significant limitations in distinguishing different types of SDB must be fully appreciated before using them to make diagnostic and therapeutic decisions (level of evidence C).

E. The level of experience and training available to interpret the results of sleep monitoring is as important as the type of sleep monitoring (level of evidence D).

F. All sleep monitoring should be conducted with an appropriate quality assurance program and interpreted by a physician trained in the diagnosis of SDB (level of evidence D).

G. Clinical prediction formulas can be used to assess the pretest probability of SDB, and to prioritize patients for evaluation, but are not sufficient to establish a diagnosis (level of evidence C).

OSAHS

A. Driving

1. There is an increased risk of motor vehicle collisions in untreated patients with OSAHS (level of evidence B).

2. Predicting motor vehicle collisions in patients with OSAHS is inexact due to multiple confounding factors (prior sleep, shift work, medications and adherence to medical treatments), all of which may influence risk (level of evidence C).
3. While any motor vehicle driver has an individual and statutory duty to drive safely to avoid foreseeable harm to others, physicians should advise all patients with OSAHS about the dangers of driving while sleepy (level of evidence D).
4. Reporting of sleepy drivers by physicians to their motor vehicle departments should be in accordance with local legislation (level of evidence D).
5. Patients with OSAHS may safely resume driving once successful treatment has been established, and in compliance with local regulations (level of evidence C).

B. Health care utilization and economic impact

1. Patients with OSAHS have increased health care expenditures for many years before diagnosis (level of evidence C).
2. SHVS is the type of SDB associated with the highest health care expenditures because these patients often require hospitalization (level of evidence C).
3. Continuous positive airway pressure (CPAP) decreases health care expenditures during the first two years after the diagnosis of OSAHS (level of evidence C).
4. Treatment of OSAHS is a cost-effective use of health care resources (level of evidence B).

C. Behavioural and pharmacological treatment

1. Weight loss should be encouraged in all obese patients with OSAHS, however, attempts to lose weight should not delay the initiation of additional treatment if indicated (level of evidence B).
2. Patients should be informed of the potential for alcohol and sedatives to exacerbate OSAHS (level of evidence C).
3. Relief of nasal obstruction should not be viewed as a primary treatment for OSAHS, but as an adjunct to facilitate effective treatment with CPAP or oral appliances (level of evidence C).
4. Patients with positional OSAHS may derive significant clinical benefit from positional therapy (level of evidence C).
5. Pharmacological agents (eg, serotonin reuptake inhibitors and progesterone) are not effective therapies for OSAHS (level of evidence B).
6. Agents that promote wakefulness may be a useful adjunct in the treatment of patients who remain sleepy despite adequate sleep hygiene, and who comply with effective treatment for OSAHS (level of evidence B).

D. Which patients should be treated and how should they be followed?

1. All patients with OSAHS should be offered a treatment trial to improve their symptoms (level of evidence B).
2. The indications for the treatment of asymptomatic patients with abnormal sleep monitoring are unclear. Treatment may be considered in asymptomatic patients with significant comorbid illness, who work in a safety critical occupation, or who have an apnea/hypopnea index greater than 30 events per hour (level of evidence C).
3. Treatment adherence should be assessed within two to four weeks of initiation of treatment (level of evidence D).
4. Patients initiated on treatment should undergo follow-up within three months, by a physician or alternate care provider supervised by a physician, to assess their symptomatic response and adherence to treatment (level of evidence D).
5. Long-term follow-up by either a primary care provider or a sleep disorders specialist should be arranged in a similar fashion to other chronic diseases (level of evidence D).
6. Patient education about the nature, complications and treatment of OSAHS by a trained health care professional (respiratory therapist/nurse/polysomnographic technologist) is an important component of all treatment strategies (level of evidence D).

E. CPAP therapy

1. Conventional CPAP at a fixed pressure is the primary treatment for patients with OSAHS (level of evidence B).
2. Automatic CPAP is an effective treatment for OSAHS in the absence of comorbid disease, but treatment effectiveness may vary among different machines (level of evidence B).
3. It is unclear if patients benefit from the additional cost of automatic CPAP compared with conventional CPAP (level of evidence B).
4. A CPAP titration polysomnogram remains the accepted standard to determine optimal CPAP pressure (level of evidence D).
5. Optimal CPAP pressure can also be determined from the pressure profile from a trial of automatic CPAP, provided there is a careful assessment of recording conditions and a detailed analysis of the pressure profile (level of evidence B).
6. Persistent low CPAP use (less than 4 h per night) over two months, following efforts to improve patient comfort, should lead to a review of treatment (level of evidence D).
7. CPAP therapy should not be abandoned without considering the following (level of evidence D):

a. The attention of a trained CPAP health care professional (ie, respiratory therapist/nurse);

b. A titration polysomnogram study or the use of automatic CPAP to troubleshoot problems;

c. The use of heated humidification.

8. Bilevel ventilation should not be used routinely in OSAHS, and should be reserved for patients with SHVS or patients intolerant of conventional and automatic CPAP (level of evidence D).

F. Oral appliances

1. Oral appliances are an appropriate first-line therapy for patients with mild-moderate OSAHS with minimal daytime symptoms (level of evidence A).
2. Oral appliances are an appropriate alternative therapy for patients who are unable to tolerate CPAP (level of evidence A).
3. Oral appliances should be fitted by qualified dental practitioners who have undertaken special training in SDB (level of evidence D).
4. The use of oral appliances should be monitored clinically following initiation of therapy to allow appliance adjustment and assessment of symptoms and side effects (level of evidence D).
5. Patients should undergo follow-up sleep monitoring with the oral appliance to ensure effective treatment (level of evidence D).
6. Patients initiated on treatment with an oral appliance should be seen in follow-up by a qualified dental practitioner regularly during the first year and then every year thereafter to monitor treatment adherence, appliance deterioration and oral health (level of evidence D).

G. Upper airway surgery

1. The presence of large tonsils in a patient with OSAHS should prompt referral to an otolaryngologist for consideration of tonsillectomy (level of evidence D).
2. OSAHS should be excluded in patients before they are considered for upper airway surgery for snoring (level of evidence C).
3. Patients being offered palatal surgery for snoring should be informed about the failure and success rates of the procedure they are having performed and of the risk of difficulty with CPAP use if they later develop OSAHS (level of evidence D).
4. Laser-assisted uvulopalatoplasty is not recommended for the treatment of OSAHS (level of evidence B).
5. Uvulopalatopharyngoplasty may be considered in selected patients with OSAHS who have failed CPAP and/or oral appliance treatment (level of evidence D).
6. Maxillomandibular surgery may be effective in carefully selected patients with OSAHS who have failed CPAP and/or oral appliance treatment (level of evidence C).
7. Tracheostomy should only be considered in carefully selected patients with OSAHS when all other treatments fail (level of evidence D).
8. Most forms of upper airway surgery have not been proven to be beneficial for the treatment of OSAHS in controlled clinical trials. New or unproven procedures should be considered experimental and be rigorously tested in research studies before widespread implementation in clinical practice (level of evidence C).

H. Anaesthesia

1. Patients with OSAHS are at an increased risk for a difficult endotracheal intubation (level of evidence C).
2. Medications administered during anaesthesia and the postoperative period may increase the severity of OSAHS postoperatively (level of evidence C).
3. Patients with OSAHS should be initiated on treatment before surgery. When a patient is being treated by CPAP preoperatively, this should be continued immediately following surgery (level of evidence D).
4. All patients at risk of respiratory complications from OSAHS should be monitored with oximetry postoperatively. Patients who are thought to be at an increased risk of cardiac ischemia or arrhythmia should also have cardiac monitoring (level of evidence D).
5. CPAP is not a substitute for adequate postoperative monitoring (level of evidence D).

CSAHS/CSBS

1. CSBS is associated with an increased mortality in patients with heart failure (level of evidence B).
2. Optimal medical management is the first-line therapy for CSBS in patients with heart failure (level of evidence C).
3. CPAP and/or oxygen are not recommended as routine therapy for patients with CSBS and heart failure (level of evidence B).
4. There are no proven therapies for idiopathic CSAHS (level of evidence D).

SHVS

1. All patients with suspected SHVS require urgent referral for specialist assessment and long-term follow-up (level of evidence D).
2. CPAP is the first-line treatment for patients with SHVS when there is associated upper airway obstruction (level of evidence D).
3. Assisted ventilation (bilevel positive airway pressure with or without a timed backup rate, and pressure and volume-cycled ventilators) should be considered if CPAP fails to improve daytime and nocturnal gas exchange (level of evidence D).

4. Oxygen should be considered in patients who have persistent hypoxemia despite treatment with CPAP or assisted ventilation (level of evidence D).
5. Treatment should be initiated in an intensive care unit, sleep laboratory, or other closely monitored setting with appropriate support to ensure safe and effective implementation of CPAP, assisted ventilation and oxygen (level of evidence D).
6. The effectiveness of treatment should be verified with attended polysomnography and arterial blood gas testing to objectively assess the impact on daytime and nocturnal gas exchange (level of evidence D).

RECOMMENDED READING

1. American Academy of Sleep Medicine. International Classification of Sleep Disorders, 2nd edition: Diagnostic and Coding Manual. Westchester: American Academy of Sleep Medicine, 2005.
2. American Society of Anesthesiologists. Practice Guidelines for the Perioperative Management of Patients with Obstructive Sleep Apnea. <http://www.asahq.org/publicationsAndServices/practiceparam.htm#apnea> (Version current at July 5, 2006).
3. American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway: An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology 2003;98:1269-77. (Erratum in 2004;101:565).
4. ATS/ACCP/AASM Taskforce Steering Committee. Executive summary on the systematic review and practice parameters for portable monitoring in the investigation of suspected sleep apnea in adults. Am J Respir Crit Care Med 2004;169:1160-3.
5. Centers for Medicare & Medicaid Services. Medicare coverage database. <https://www.cms.hhs.gov/mcd/viewdecisionmemo.asp> (Version current at July 5, 2006).
6. Chesson AL Jr, Berry RB, Pack A; American Academy of Sleep Medicine; American Thoracic Society; American College of Chest Physicians. Practice parameters for the use of portable monitoring devices in the investigation of suspected obstructive sleep apnea in adults. Sleep 2003;26:907-13.
7. College of Physicians and Surgeons of Ontario. Clinical Practice Parameters and Facility Standards for Sleep Medicine, 2nd edn. Toronto: College of Physicians and Surgeons of Ontario, 2005.
8. Ferguson KA, Cartwright R, Rogers R, Schmidt-Nowara W. Oral appliances for snoring and obstructive sleep apnea: A review. Sleep 2006;29:244-62.
9. Flemons WW, Littner MR, Rowley JA, et al. Home diagnosis of sleep apnea: A systematic review of the literature. An evidence review cosponsored by the American Academy of Sleep Medicine, the American College of Chest Physicians, and the American Thoracic Society. Chest 2003;124:1543-79.
10. George CF. Standards for polysomnography in Canada. The Standards Committees of the Canadian Sleep Society and the Canadian Thoracic Society. CMAJ 1996;155:1673-8.
11. Giles TL, Lasserson TJ, Smith BJ, White J, Wright J, Cates CJ. Continuous positive airways pressure for obstructive sleep apnoea in adults. In: The Cochrane Library, Issue 1, 2006. Chichester, UK: John Wiley & Sons, Ltd.
12. Haniffa M, Lasserson TJ, Smith I. Interventions to improve compliance with continuous positive airway pressure for obstructive sleep apnoea. In: The Cochrane Library, Issue 2, 2006. Chichester, UK: John Wiley & Sons, Ltd.
13. Kushida CA, Littner MR, Morgenthaler T, et al. Practice parameters for the indications for polysomnography and related procedures: An update for 2005. Sleep 2005;28:499-521.
14. Kushida CA, Morgenthaler TI, Littner MR, et al; American Academy of Sleep. Practice parameters for the treatment of snoring and obstructive sleep apnea with oral appliances: An update for 2005. Sleep 2006;29:240-3.
15. Lim J, Lasserson TJ, Fleetham J, Wright J. Oral appliances for obstructive sleep apnoea. In: The Cochrane Library, Issue 1, 2006. Chichester, UK: John Wiley & Sons, Ltd.
16. Loube DI, Gay PC, Strohl KP, Pack AI, White DP, Collop NA. Indications for positive airway pressure treatment of adult obstructive sleep apnea patients: A consensus statement. Chest 1999;115:863-6.
17. Meoli AL, Casey KR, Clark RW, et al; Clinical Practice Review Committee. Hypopnea in sleep-disordered breathing in adults. Sleep 2001;24:469-70.
18. Meoli AL, Rosen CL, Kristo D, et al; Clinical Practice Review Committee; American Academy of Sleep Medicine. Upper airway management of the adult patient with obstructive sleep apnea in the perioperative period – Avoiding complications. Sleep 2003;26:1060-5.
19. Practice parameters for the indications for polysomnography and related procedures. Polysomnography Task Force, American Sleep Disorders Association Standards of Practice Committee. Sleep 1997;20:406-22.
20. Scottish Intercollegiate/British Thoracic Society Guideline. Management of obstructive sleep apnoea/hypopnoea syndrome in adults. Guideline No 73, 2003. <http://www.sign.ac.uk/guidelines/fulltext/73/index.html> (Version current at July 5, 2006).
21. Shneerson J, Wright J. Lifestyle modification for obstructive sleep apnoea. In: The Cochrane Library, Issue 2, 2006. Chichester, UK: John Wiley & Sons, Ltd.
22. Sleep-related breathing disorders in adults: Recommendations for syndrome definition and measurement techniques in clinical research. The Report of an American Academy of Sleep Medicine Task Force. Sleep 1999;22:667-89.
23. Smith I, Lasserson TJ, Wright J. Drug treatments for obstructive sleep apnoea. In: The Cochrane Library, Issue 2, 2006. Chichester, UK: John Wiley & Sons, Ltd.
24. Sundaram S, Bridgman SA, Lim J, Lasserson TJ. Surgery for obstructive sleep apnoea. In: The Cochrane Library, Issue 2, 2006. Chichester, UK: John Wiley & Sons, Ltd.