Technology Guidance

Positive airway pressure

for moderate-to-severe obstructive sleep apnoea

Technology Guidance from the MOH Medical Technology Advisory Committee

Guidance Recommendations

The Ministry of Health's Medical Technology Advisory Committee has recommended positive airway pressure (PAP) for the treatment of moderate-to-severe obstructive sleep apnoea (OSA) in line with the following criteria:

- ✓ Automatic positive airway pressure (APAP) or continuous positive airway pressure (CPAP) can be considered for individuals ≥ 16 years old with moderate-to-severe OSA in line with the following criteria:
  - The individual meets the adherence criteria of APAP or CPAP use for ≥4 hours per night, for 70% of nights during a one-month trial of APAP or CPAP; AND
  - The individual should be assessed and reviewed by a specialist trained in sleep medicine and credentialled by institutions to manage OSA, according to the institution-based clinical privileging criteria.

  Individuals are eligible for a one-time subsidy for APAP or CPAP.

Funding status

PAP is recommended for subsidy for the treatment of patients with moderate-to-severe OSA, in line with the abovementioned recommendations. Subsidies apply only to devices listed in the Annex.

Published: 1 April 2026

Factors considered to inform the recommendations

Technology evaluation

1.1. At the March 2025 meeting, the MOH Medical Technology Advisory Committee ("the Committee") considered the evidence presented for the technology evaluation of positive airway pressure (PAP) for treatment of moderate-to-severe obstructive sleep apnoea (OSA). The Agency for Care Effectiveness (ACE) conducted the evaluation in consultation with clinical experts from public healthcare institutions (PHIs) and patient experts from local patient and voluntary organisations. Published clinical and economic evidence for PAP was considered in line with its registered indication.

1.2. The evidence was used to inform the Committee's deliberations around five core decision-making criteria:

- Clinical need of patients and nature of the condition;
- Overall benefit of the technology for the patient and/or the system;
- Cost-effectiveness (value for money), which considers the incremental benefit and cost of the technology compared to existing alternatives;
- Estimated annual technology cost and the number of patients likely to benefit from the technology; and
- Organisational feasibility, which covers the potential impact of adopting the technology, especially barriers for diffusion.

1.3. Additional factors, including social and value judgments, may also inform the Committee's deliberations.

Clinical need

2.1. OSA is a sleep disorder where upper airway collapse during sleep causes breathing to repeatedly stop (apnoea) or reduce (hypopnoea). To resume normal breathing, an individual will experience brief awakenings. The resulting excessive daytime sleepiness (EDS) has been shown to impair cognitive function and quality of life (QoL), and increase the risk of motor vehicle accidents. If left untreated, OSA can increase the risk of serious health conditions including hypertension, cardiovascular disease, diabetes, and premature death.

2.2. The frequency of obstructive events observed during a sleep study is reported as an apnoea hypopnoea index (AHI). This measure is defined as the sum of the apnoeas and hypopnoeas observed divided by the total hours of sleep. OSA severity is classified as mild (AHI ≥5 to <15), moderate (AHI ≥15 to ≤30), and severe (AHI >30. Available data for Singapore estimates a population prevalence of 30.5% for moderate-to-severe OSA.

2.3. The Committee noted that PAP is the treatment modality of choice for adults with OSA, especially in those with moderate-to-severe OSA who have excessive sleepiness or impaired sleep-related QoL. PAP devices generate airflow and direct it into the patient's airway using tubing and a mask interface. The positive pressure from this airflow prevents upper airway collapse by maintaining positive pharyngeal transmural pressure and increasing end-respiratory lung volume.

2.4. The Committee heard that there are three types of PAP: continuous PAP (CPAP) delivers constant positive pressure throughout breathing; bilevel PAP (BPAP) delivers different pressures for inhalation and exhalation, and automatic PAP (APAP) automatically adjusts pressure based on breathing patterns.

2.5. The Committee noted that BPAP is indicated for a small subset of patients with OSA requiring pressures above 20cm H_2O. This subset includes those with severe OSA, hypoventilation or neuromuscular conditions, or have an intolerance to CPAP or APAP due to high pressure requirements. Hence, BPAP was not included in the scope of the evaluation.

2.6. The Committee considered 29 testimonials from patients and carers about what it is like living with OSA and their experience with different devices used to manage their condition. The patients and carers acknowledged that OSA had a negative impact on many aspects of their lives including, mood, energy levels, family relationships, and performance at school and work.

2.7. The Committee heard that most respondents were using PAP devices to manage their OSA and felt that they worked well and were easy to use, although some needed time to get used to wearing the device during sleep. PAP devices helped users fall asleep faster, improved their sleep, and resolved snoring, which led to reduced disturbances for partners or family members. The Committee also heard that regular use of the device improved blood pressure and made users less irritable during the day. Reported side effects of the devices were minimal and manageable.

2.8. The Committee acknowledged that most patients would like new PAP devices for OSA to be more affordable; result in a better night's sleep for them and their partners; be comfortable to use; allow them to wake up feeling refreshed, alert, vibrant and able to handle stress better; improve their breathing during sleep; and reduce snoring.

Overall benefit of technology

3.1. The Committee agreed that the main comparator to PAP for patients with moderate-to-severe OSA is usual care, including lifestyle advice such as guidance on weight loss, alcohol consumption and sleep hygiene. The Committee agreed that the secondary comparators include active controls, oral devices or surgery used in combination with lifestyle advice.

3.2. The evidence base comprised two health technology assessment (HTA) reports and 15 systematic reviews and meta-analyses (SRMAs). The HTA reports and SRMAs included studies comparing the effects of PAP with placebo,usual care or oral devices on key outcomes including safety, OSA disease severity, and EDS.

3.3. For safety, the Committee considered PAP is likely to have an acceptable safety profile. Adverse events reported, such as oral dryness and pressure intolerance, usually resolve swiftly with discontinuation of PAP or when ancillary treatments such as humidification were used. The differences in adverse events between APAP and CPAP were not considered to be clinically significant.

3.4. In terms of clinical effectiveness, the Committee noted that PAP was associated with clinically and statistically significant improvements in the key effectiveness outcomes of OSA severity and EDS, measured using the Epworth Sleepiness Scale (ESS), when compared with placebo or usual care. When compared with oral devices such as mandibular advancement devices (MADs), CPAP was associated with a statistically and clinically significant improvement in OSA severity but no clinically significant difference in reduction of EDS. Subgroup and meta-regression analyses suggested that patients with more severe baseline OSA experienced greater improvements in OSA severity and EDS with CPAP.

3.5. CPAP was also associated with statistically significant improvements in systolic and diastolic blood pressure compared with placebo and usual care. The findings in the evidence base on other effectiveness outcomes, including mortality, cardiovascular events, diabetes control, QoL and cognitive outcomes were mixed. Subgroup analyses of studies where CPAP adherence was ≥4 hours reported a statistically significant reduction in cardiovascular mortality and major adverse cardiovascular events with CPAP compared with usual care or placebo. No significant differences in outcome measures were reported with CPAP compared to APAP.

Cost effectiveness

4.1. The Committee considered the cost-effectiveness of PAP for patients with moderate-to-severe OSA based on published economic evidence from one cost utility analysis (CUA) on CPAP by the National Institute for Health and Care Excellence (NICE) from the United Kingdom (UK), one CUA on PAP (including CPAP and APAP) from the Canadian Agency for Drugs and Technologies in Health and one local cost effectiveness analysis (CEA) on CPAP from Singapore. These studies compared PAP with other interventions for OSA, including MADs, lifestyle modifications and conservative management.

4.2. The Committee noted that the CUAs and CEA considered PAP a cost-effective option in adults with moderate-to-severe OSA. The reported incremental cost-effectiveness

ratios (ICERs) were £3,899 per quality-adjusted life year (QALY) gained for patients with mild-to-severe OSA in the UK, C$8,058 per QALY gained for moderate OSA and C$7,420 per QALY gained for severe OSA in Canada, and US$13,822 per disability-adjusted life years (DALY) averted for moderate-to-severe OSA in Singapore. Key drivers of the ICER include costs of PAP treatment, adherence rates and long-term maintenance costs.

4.3. The Committee also noted that PAP is reimbursed in Australia, Belgium, Canada, France, the UK, and South Korea for the treatment of moderate-to-severe OSA.

Estimated annual technology cost

5.1. The Committee noted that the annual cost impact to the public healthcare system was estimated to be between SG$10 million to <SG$20 million, based on the projection of approximately 3,845 eligible patients with moderate-to-severe OSA in Singapore who would benefit from subsidised PAP . The budget was sensitive to changes in the uptake rate of PAP treatment after the one-month PAP trial.

Organisational feasibility

6.1. The Committee noted that if PAP was subsidised for moderate-to-severe OSA, organisational feasibility issues raised by PHIs would include potential capacity or workflow issues due to lack of manpower to implement the one-month PAP trial and conduct PAP counselling and monitoring, as well as the operational workflow variations across PHIs. Currently ipatients eligible for PAP first enrol into a one-month PAP trial using a device on loan from a PHI or external vendor. Following the trial, patients keen to continue treatment are referred to external vendors or PHI retail pharmacies to purchase their own PAP flow generator.

Additional considerations

7.1. Subsidy would only apply to the PAP flow generator. In view of the variations in workflow and charges across PHIs as well as PAP mask interface selection being highly dependent on patient preference , subsidies would not apply to the one-month PAP trial or to replacement PAP consumables, including the mask interface and tubing.

Recommendations

8.1. Based on available evidence, the Committee recommended subsidising APAP or CPAP for the treatment of moderate-to-severe OSA in adults, as they showed

acceptable safety, clinical effectiveness and cost-effectiveness compared with placebo and usual care for the key effectiveness outcomes of OSA severity and EDS. The proposed subsidy criteria are:

- ✓ Automatic positive airway pressure (APAP) or continuous positive airway pressure (CPAP) can be considered for individuals ≥ 16 years old with moderate-to-severe obstructive sleep apnoea (OSA) in line with the following criteria:
  - The individual meets the adherence criteria of APAP or CPAP use for ≥4 hours per night, for 70% of nights during a one-month trial of APAP or CPAP; AND
  - The individual should be assessed and reviewed by a specialist trained in sleep medicine and credentialled by institutions to manage OSA, according to the institution-based clinical privileging criteria.

  Individuals are eligible for a one-time subsidy for APAP or CPAP.

8.2. Subsidies apply only to models listed in the Annex of this guidance.

VERSION HISTORY

Guidance on positive airway pressure
for treatment of moderate-to-severe OSA

This Version History is provided to track any updates or changes to the guidance following the first publication date. It is not part of the guidance.

1. **Publication of guidance**

Date of Publication	1 April 2026

Agency for Care Effectiveness - ACE Agency for Care Effectiveness (ACE)

About the Agency

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