



**Continuous Positive Airways Pressure (CPAP) for the Treatment  
of Obstructive Sleep Apnoea/hypopnoea Syndrome (OSAHS)**

**MTA Submission to the National Institute for Health and Clinical Excellence  
20<sup>th</sup> of February 2007**

## 2.0 Glossary of Terms

---

CNS	Central Nervous System
CPAP	Continuous Positive Airway Pressure
ECG	Electrocardiogram
EEG	Electroencephalogram
EMG	Electromyogram
EOG	Electrooculogram
ESS	Epworth Sleepiness Scale
MeSH	Medical Subheading
MAJR	Major Descriptor
OSAHS	Obstructive Sleep Apnoea Hypopnoea Syndrome
PSG	Polysomnography
QOL	Quality of Life
QALY	Quality Adjusted Life Year
rH	Relative Humidity
SDB	Sleep Disordered Breathing

### 3.0 Executive Summary

---

#### 3.1 Background

Characterized by the cessation of breath during sleep, Obstructive Sleep Apnoea Hypopnoea Syndrome (OSAHS) is a prevalent condition that affects around 4% of middle aged men and 2% of middle aged women. Down stream effects of the condition are significant. Patients who suffer from OSAHS are at increased risk of cardiovascular and cerebrovascular morbidity and mortality. Treatment options for OSAHS include supportive care, surgery, positional therapy, dental devices and continuous positive air way pressure (CPAP). Since its introduction in the early 1980s CPAP therapy has become the medical therapy of choice for the treatment of OSAHS. Over this time CPAP therapy has proven to be both safe and clinically effective at eliminating obstructive apnoeas. The device acts to prevent upper airway collapse by acting as a pneumatic splint and subsequently restoring sleep architecture. To be effective CPAP therapy must be used every time the patient sleeps, unfortunately compliance rates for therapy are low, with 20% to 50% of patients not using CPAP therapy at all. There are several reasons for non compliance, including poor mask fit, pressure intolerance and most commonly upper airway symptoms. The majority of upper airway symptoms can be alleviated with heated humidification. Heated humidification is an important adjunct to CPAP therapy that is often neglected. For this reason the focus of this submission looks specifically at the clinical effectiveness of CPAP therapy with heated humidification for the treatment of OSAHS.

#### 3.2 Clinical Effectiveness

##### 3.2.1 Methods

A systematic literature search was carried out on Monday the 22<sup>nd</sup> of January to identify literature that assessed the use of CPAP with heated humidification for the treatment of OSAHS. The following databases were searched:

Medline	1951 to date
The Cochrane Library	1966 to date

Further information on specific search strings for each data base is outlined in section 5.2.1 and 5.2.3.

### 3.2.2 Results

101 unique records were found and were hand sorted. Articles that met the inclusion criteria defined in the scope were included in the review. Articles thought to be relevant which did not meet the inclusion criteria are listed in section 5.4. The reason for exclusion and subsequent reason for inclusion is defined for each article.

### 3.2.3 Discussion

The systematic search of the literature revealed that CPAP therapy can significantly affect nasal airway function which can lead to upper airway side effects. Inadequate heated humidification was shown to cause respiratory mucociliary dysfunction, inflammation, increased mucosal blood flow and subsequent congestion. Once nasal congestion has developed, increases in mucosal blood flow leads to increased airway resistance, which in turn promotes breathing through the oral route. Mouth leak or mouth breathing further exacerbates the mucosal drying and subsequent congestion, creating a destructive cycle. Research suggests that heated humidification can alleviate these side effects and is superior to cold pass over humidification. Adequate heated humidification has been shown to prevent increases in nasal airway resistance, reduce mouth leak and improve compliance. In addition patient's who are given heated humidity at the initiation of treatment were shown to be more compliant than those who started CPAP treatment without humidity. Conventional heated humidifiers are not without their limitations which can adversely affect CPAP therapy and possibly counteract its benefits. The amount of humidity a conventional humidifier can provide is limited by ambient room temperatures. Temperature fluctuations throughout the night can affect the maximum amount of water that the air can hold. As a result a reduction in ambient air temperature can cause water to accumulate in the tube which can cause both a disruptive gurgling sound and transient fluctuation of pressure at the mask. These side effects can be reduced by the use of a CPAP device with a heated humidifier coupled with a heated breathing tube which delivers a constant level of humidity to the patient irrespective of ambient room temperature. The benefits of this technology are three fold, mask stability is maintained, condensation is prevented and optimal humidity is delivered to the patient in all environments.

### 3.3 Impact on the NHS

OSAHS is a major public health concern, the New England Medical Journal indicated that sleep disordered breathing (SDB) and in particular OSAHS is a health concern equivalent to smoking. Research indicates that patients who suffer from OSAHS place considerable financial strain on the healthcare system, using up to 50% more medical resources than age and sex matched controls. Healthcare costs occur not only due to co-morbidities associated with OSAHS but also due to the hazardous nature of excessive daytime sleepiness. It has been well established that OSAHS increases the risk of car and work accidents. Research from the United States indicates that treating all drivers who suffer from OSAHS with CPAP would save \$US11.1 billion in collision costs and 980 lives annually. In comparison to other publicly funded treatment CPAP compares favourably. Despite research into the positive benefits of CPAP treatment drop outs are substantial. One of the major causes of CPAP discomfort is symptoms to the upper airway. The addition of heated humidification to CPAP treatment is a cost effective methods to alleviate nasal discomfort and reduce the number of potential drop outs.

### 3.4 Conclusion

CPAP therapy is both a clinically and cost effective treatment for OSAHS. Compliance with CPAP therapy is firmly established in the first 2-weeks of therapy. For this reason it is imperative that the best efforts are made to enhance therapy comfort and minimise side effects at the onset of therapy. Heated humidification should be considered a mandatory adjunct to therapy upon initiation in order to offer the best chance of success for CPAP users.

---