



Obstructive sleep apnoea/ hypopnoea syndrome and obesity hypoventilation syndrome in over 16s

NICE guideline

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Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the [Yellow Card Scheme](#).

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should [assess and reduce the environmental impact of implementing NICE recommendations](#) wherever possible.

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This guideline partially replaces TA139.

Overview

This guideline covers the diagnosis and management of obstructive sleep apnoea/hypopnoea syndrome (OSAHS), obesity hypoventilation syndrome (OHS) and chronic obstructive pulmonary disease with OSAHS (COPD–OSAHS overlap syndrome) in people over 16. It aims to improve recognition, investigation and treatment of these related conditions.

MHRA safety alert for Philips ventilator, CPAP and BiPAP devices: In June 2021, the MHRA issued a [National Patient Safety Alert for Philips ventilator, CPAP and BiPAP devices: Potential for patient harm due to inhalation of particles and volatile organic compounds](#). This applies to all devices manufactured before 26 April 2021.

Who is it for?

- Healthcare professionals, including dentists
- Commissioners and providers
- People with OSAHS, OHS or COPD–OSAHS overlap syndrome, and their families and carers

1 Obstructive sleep apnoea/hypopnoea syndrome

People have the right to be involved in discussions and make informed decisions about their care, as described in [NICE's information on making decisions about your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

Please note that the following guidance from the Driver and Vehicle Licensing Agency (DVLA) and the UK government is relevant to these recommendations:

- [DVLA guidance on assessing fitness to drive: a guide for medical professionals](#)
- [DVLA guidance on excessive sleepiness and driving](#)
- [UK government guidance on COVID-19: infection prevention and control](#).

Obstructive sleep apnoea/hypopnoea syndrome (OSAHS) is a condition in which the upper airway is narrowed or closes during sleep when muscles relax, causing under breathing ([hypopnoea](#)) or stopping breathing ([apnoea](#)). The person wakes or lightens sleep to stop these episodes, which can lead to disrupted sleep and potentially excessive sleepiness.

1.1 Initial assessment for OSAHS

When to suspect OSAHS

- 1.1.1 Take a sleep history and assess people for OSAHS if they have 2 or more of the following features:

- snoring
- witnessed apnoeas
- unrefreshing sleep
- waking headaches
- unexplained excessive sleepiness, tiredness or fatigue
- nocturia (waking from sleep to urinate)
- choking during sleep
- sleep fragmentation or insomnia
- cognitive dysfunction or memory impairment.

1.1.2 Be aware that there is a higher prevalence of OSAHS in people with any of the following conditions:

- obesity or overweight
- obesity or overweight in pregnancy
- treatment-resistant hypertension
- type 2 diabetes
- cardiac arrhythmia, particularly atrial fibrillation
- stroke or transient ischaemic attack
- chronic heart failure
- moderate or severe asthma
- polycystic ovary syndrome
- Down's syndrome
- non-arteritic anterior ischaemic optic neuropathy (sudden loss of vision in 1 eye due to decreased blood flow to the optic nerve)

- hypothyroidism
- acromegaly.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on when to suspect OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review A: when to suspect OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

Assessment scales for suspected OSAHS

1.1.3 When assessing people with suspected OSAHS:

- Use the [Epworth Sleepiness Scale](#) in the preliminary assessment of sleepiness.
- Consider using the [STOP-Bang Questionnaire](#) as well as the Epworth Sleepiness Scale.

1.1.4 Do not use the Epworth Sleepiness Scale alone to determine if referral is needed, because not all people with OSAHS have excessive sleepiness.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on assessment scales for suspected OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review B: assessment tools for people with suspected OSAHS, OHS or COPD–OSAHS overlap syndrome](#).

1.2 Prioritising people for rapid assessment by a sleep service

See also [recommendation 4.1.1 on providing information for people with suspected OSAHS who are being referred to a sleep service.](#)

1.2.1 When referring people with suspected OSAHS to a sleep service, include the following information in the referral letter to facilitate rapid assessment:

- results of the person's assessment scores
- how sleepiness affects the person
- comorbidities
- occupational risk
- oxygen saturation and blood gas values, if available.

1.2.2 Within the sleep service, prioritise people with suspected OSAHS for rapid assessment if any of the following apply:

- they have a vocational driving job
- they have a job for which vigilance is critical for safety
- they have unstable cardiovascular disease, for example, poorly controlled arrhythmia, nocturnal angina or treatment-resistant hypertension
- they are pregnant
- they are undergoing preoperative assessment for major surgery
- they have non-arteritic anterior ischaemic optic neuropathy.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on prioritising people for rapid assessment by a sleep service](#).

Full details of the evidence and the committee's discussion are in [evidence review C: prioritisation for rapid assessment at a sleep centre of people with suspected OSAHS, OHS or COPD–OSAHS overlap syndrome](#).

1.3 Diagnostic tests for OSAHS

See also [section 4 on providing information for people who have been diagnosed with OSAHS](#).

- 1.3.1 Offer home respiratory polygraphy to people with suspected OSAHS.
- 1.3.2 If access to home respiratory polygraphy is limited, consider home oximetry for people with suspected OSAHS. Take into account that oximetry alone may be inaccurate for differentiating between OSAHS and other causes of hypoxaemia in people with heart failure or chronic lung diseases.
- 1.3.3 Consider respiratory polygraphy or polysomnography if oximetry results are negative but the person has significant symptoms.
- 1.3.4 Consider hospital respiratory polygraphy for people with suspected OSAHS if home respiratory polygraphy and home oximetry are impractical or additional monitoring is needed.
- 1.3.5 Consider polysomnography if respiratory polygraphy results are negative but symptoms continue.
- 1.3.6 Use the results of the [sleep study](#) to diagnose OSAHS and determine the [severity of OSAHS](#) (mild, moderate or severe).

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on diagnostic tests for OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review D: diagnostic tests for OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

1.4 Lifestyle advice for all severities of OSAHS

1.4.1 Discuss appropriate lifestyle changes with all people with OSAHS. Provide support and information on losing weight, stopping smoking, reducing alcohol intake and improving sleep hygiene, tailored to the person's needs and in line with the NICE guidelines on:

- [tobacco: preventing uptake, promoting quitting and treating dependence](#)
- [overweight and obesity management](#)
- [alcohol-use disorders: prevention](#) (in particular, recommendations on screening, brief advice and extended brief interventions for adults).

For a short explanation of why the committee made this recommendation and how it might affect practice, see the [rationale and impact section on lifestyle advice for all severities of OSAHS](#).

1.5 Treatments for mild OSAHS

See also [section 4 on providing information for people starting treatment for OSAHS](#).

Lifestyle advice alone for mild OSAHS

1.5.1 Explain to people with mild OSAHS who have no symptoms or with symptoms that do not affect usual daytime activities that:

- treatment is not usually needed **and**

- changes to lifestyle and sleep habits (see [recommendation 1.4.1](#) on lifestyle advice) can help to prevent OSAHS from worsening.

Continuous positive airway pressure for mild OSAHS

Recommendation 1.5.2 updates [recommendation 1.2](#) in NICE's technology appraisal guidance on continuous positive airway pressure for the treatment of obstructive sleep apnoea/hypopnoea syndrome.

- 1.5.2 For people with mild OSAHS who have symptoms that affect their quality of life and usual daytime activities, offer fixed-level continuous positive airway pressure (CPAP):
- at the same time as lifestyle advice if they have any of the [priority factors](#) listed in [recommendation 1.2.2](#) **or**
 - if lifestyle advice alone has been unsuccessful or is considered inappropriate.
- 1.5.3 For people with mild OSAHS having CPAP:
- Offer [telemonitoring](#) with CPAP for up to 12 months.
 - Consider using telemonitoring beyond 12 months.
- 1.5.4 Consider auto-CPAP as an alternative to fixed-level CPAP in people with mild OSAHS if:
- high pressure is needed only for certain times during sleep **or**
 - they are unable to tolerate fixed-level CPAP **or**
 - telemonitoring cannot be used for technological reasons **or**
 - auto-CPAP is available at the same or lower cost than fixed-level CPAP, and this price is guaranteed for an extended period of time.
- 1.5.5 Consider heated humidification for people with mild OSAHS having CPAP who have upper airway side effects, such as nasal and mouth dryness, and CPAP-

induced rhinitis.

Reducing the risk of transmission of infection when using CPAP

- 1.5.6 Be aware that CPAP is an aerosol-generating procedure and, if there is a risk of airborne infection, such as COVID-19, appropriate infection control precautions should be taken. These may include setting up the device at home by video consultation or with precautions in hospital.

For more information, see the [UK government guidance on COVID-19: infection prevention and control](#) and local guidance.

Mandibular advancement splints for mild OSAHS

- 1.5.7 If a person with mild OSAHS and symptoms that affect their usual daytime activities is unable to tolerate or declines to try CPAP, consider a customised or semi-customised [mandibular advancement splint](#) as an alternative to CPAP if they:
- are aged 18 and over **and**
 - have optimal dental and periodontal health.
- 1.5.8 Be aware that semi-customised mandibular advancement splints may be inappropriate for people with:
- active periodontal disease or untreated dental decay
 - few or no teeth
 - generalised tonic-clonic seizures.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on treatments for mild OSAHS](#).

Full details of the evidence and the committee's discussion are in:

- [evidence review E: CPAP devices for the treatment of mild OSAHS](#)
- [evidence review F: positive airway pressure therapy variants for OSAHS, OHS and COPD–OSAHS overlap syndrome](#)
- [evidence review G: oral devices](#).

1.6 Treatments for moderate and severe OSAHS

See also [section 4 on providing information for people starting treatment for OSAHS](#).

CPAP for moderate and severe OSAHS

CPAP is recommended as a treatment option for adults with moderate or severe symptomatic OSAHS in [NICE's technology appraisal guidance on continuous positive airway pressure for the treatment of obstructive sleep apnoea/hypopnoea syndrome](#).

- 1.6.1 Offer fixed-level CPAP, in addition to lifestyle advice, to people with moderate or severe OSAHS.
- 1.6.2 For people with moderate or severe OSAHS having CPAP:
- Offer telemonitoring with CPAP for up to 12 months.
 - Consider using telemonitoring beyond 12 months.
- 1.6.3 Consider auto-CPAP as an alternative to fixed-level CPAP in people with moderate or severe OSAHS if:
- high pressure is needed only for certain times during sleep **or**

- they are unable to tolerate fixed-level CPAP **or**
- telemonitoring cannot be used for technological reasons **or**
- auto-CPAP is available at the same or lower cost than fixed-level CPAP, and this price is guaranteed for an extended period of time.

1.6.4 Consider heated humidification for people with moderate or severe OSAHS having CPAP who have upper airway side effects such as nasal and mouth dryness, and CPAP-induced rhinitis.

Reducing the risk of transmission of infection when using CPAP

1.6.5 Be aware that CPAP is an aerosol-generating procedure and, if there is a risk of airborne infection, such as COVID-19, appropriate infection control precautions should be taken. These may include setting up the device at home by video consultation or with precautions in hospital.

For more information, see the [UK government guidance on COVID-19: infection prevention and control](#) and local guidance.

Mandibular advancement splints for moderate and severe OSAHS

1.6.6 If a person with moderate or severe OSAHS is unable to tolerate or declines to try CPAP, consider a customised or semi-customised mandibular advancement splint as an alternative to CPAP if they:

- are aged 18 and over **and**
- have optimal dental and periodontal health.

1.6.7 Be aware that semi-customised mandibular advancement splints may be inappropriate for people with:

- active periodontal disease or untreated dental decay
- few or no teeth

- generalised tonic-clonic seizures.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on treatments for moderate and severe OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review F: positive airway pressure therapy variants for OSAHS, OHS and COPD–OSAHS overlap syndrome](#) and [evidence review G: oral devices](#).

1.7 Further treatment options for OSAHS

Positional modifiers for OSAHS

- 1.7.1 Consider a [positional modifier](#) for people with mild or moderate [positional OSAHS](#) if other treatments are unsuitable or not tolerated.
- 1.7.2 Be aware that positional modifiers are unlikely to be effective in severe OSAHS.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on positional modifiers for OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review H: positional modifiers](#).

Surgery for OSAHS

- 1.7.3 Consider tonsillectomy for people with OSAHS who have large obstructive tonsils and a body mass index (BMI) of less than 35 kg/m².
- 1.7.4 Consider referral for assessment for oropharyngeal surgery in people with severe OSAHS who have been unable to tolerate CPAP and a customised mandibular

advancement splint despite medically supervised attempts.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on surgery for OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review J: surgery](#).

1.8 Managing rhinitis in people with OSAHS

- 1.8.1 Assess people with nasal congestion and OSAHS for underlying allergic or vasomotor rhinitis.
- 1.8.2 If rhinitis is diagnosed in people with OSAHS, offer initial treatment with:
- topical nasal corticosteroids or antihistamines for allergic rhinitis **or**
 - topical nasal corticosteroids for vasomotor rhinitis.
- 1.8.3 For people with OSAHS and persistent rhinitis, consider referral to an ear, nose and throat specialist if:
- symptoms do not improve with initial treatment **or**
 - anatomical obstruction is suspected.
- 1.8.4 Be aware that:
- rhinitis can affect people's tolerance to CPAP but changing from a nasal to an orofacial mask and adding humidification can help (see [recommendation 1.5.5 on heated humidification for mild OSAHS](#) and [recommendation 1.6.4 on heated humidification for moderate and severe OSAHS](#))
 - CPAP can worsen or cause rhinitis and nasal congestion.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on managing rhinitis in people with OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review K: rhinitis](#).

1.9 Follow-up and monitoring for people with OSAHS

- 1.9.1 Tailor follow-up to the person's overall treatment plan, which may include lifestyle changes and treating comorbidities. See the [recommendations on tailoring healthcare services for each patient in the NICE guideline on patient experience in adult NHS services](#).

Follow-up for people using CPAP

- 1.9.2 Offer face-to-face, video or phone consultations, including review of telemonitoring data (if available), to people with OSAHS having CPAP. This should include:
- an initial consultation within 1 month **and**
 - subsequent follow-up according to the person's needs and until optimal control of symptoms and [apnoea-hypopnoea index \(AHI\)](#) or [oxygen desaturation index \(ODI\)](#) is achieved.
- 1.9.3 Once CPAP is optimised, consider annual follow-up for people with OSAHS.
- 1.9.4 Offer people with OSAHS having CPAP access to a sleep service for advice, support and equipment between follow-up appointments.

Follow-up for people using mandibular advancement splints

- 1.9.5 Offer face-to-face, video or phone consultations, including review of downloads from the device (if available), to people with OSAHS using a mandibular advancement splint. This should include:
- initial follow-up to review adjustment of the device and symptom improvement at 3 months **and**
 - subsequent follow-up according to the person's needs and until optimal control of symptoms and AHI or ODI is achieved.

Follow-up for people using positional modifiers

- 1.9.6 Offer face-to-face, video or phone consultations, including review of downloads from the device (if available), to people with OSAHS using a positional modifier. This should include:
- an initial consultation within 3 months **and**
 - subsequent follow-up according to the person's needs until optimal control of symptoms and AHI or ODI is achieved.

Follow-up for people who have had surgery

- 1.9.7 Offer people with OSAHS who have had surgery:
- an initial follow-up consultation with respiratory polygraphy within 3 months of the operation **and**
 - subsequent follow-up according to the person's needs.

Follow-up for drivers with excessive sleepiness

- 1.9.8 Ensure follow-up is in line with [Driver and Vehicle Licensing Agency guidance on assessing fitness to drive](#).

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on follow-up for people with OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review L: monitoring](#).

Monitoring treatment efficacy

- 1.9.9 Assess the effectiveness of treatment with CPAP, mandibular advancement splints and positional modifiers in people with OSAHS by reviewing the following:
- OSAHS symptoms, including the [Epworth Sleepiness Scale](#) and vigilance, for example, when driving
 - severity of OSAHS, using AHI or ODI
 - adherence to therapy
 - telemonitoring data or download information from the device (if available).
- 1.9.10 Explore with people using CPAP their understanding and experience of treatment, and review the following:
- mask type and fit, including checking for leaks
 - nasal or mouth dryness, and the need for humidification
 - other factors affecting sleep disturbance such as insomnia, restless legs and shift work
 - sleep hygiene
 - cleaning and maintenance of equipment.
- 1.9.11 Consider stopping treatment if OSAHS may have resolved, for example, with significant weight loss. After at least 2 weeks without treatment:
- re-evaluate any return of symptoms **and**

- consider a sleep study.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on monitoring treatment efficacy in people with OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review M: demonstration of efficacy](#).

1.10 Supporting adherence to treatment for OSAHS

- 1.10.1 Offer people with OSAHS educational or supportive interventions, or a combination of these, tailored to the person's needs and preferences, to improve adherence to CPAP, mandibular advancement splints and positional modifiers.
- 1.10.2 Interventions to support adherence to treatment for OSAHS should be given by trained specialist staff when treatment is started and as needed at follow-up.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on supporting adherence to treatment for OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review N: adherence](#).

2 Obesity hypoventilation syndrome

People have the right to be involved in discussions and make informed decisions about their care, as described in [NICE's information on making decisions about your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

Please note that the following guidance from the Driver and Vehicle Licensing Agency (DVLA) and the UK government is relevant to these recommendations:

- [DVLA guidance on assessing fitness to drive: a guide for medical professionals](#)
- [DVLA guidance on excessive sleepiness and driving](#)
- [UK government guidance on COVID-19: infection prevention and control](#).

Obesity hypoventilation syndrome (OHS) is defined as the combination of obesity (body mass index [BMI] of 30 kg/m² or more), raised arterial or arterialised capillary carbon dioxide (CO₂) level when awake, and breathing abnormalities during sleep, which may consist of obstructive [apnoeas](#) and [hypopnoeas](#), or hypoventilation, or a combination of both. OHS is a specific form of chronic ventilatory failure.

2.1 Initial assessment for OHS

When to suspect OHS

2.1.1 Take a sleep history and assess people for OHS if they have a BMI of 30 kg/m² or more with:

- features of obstructive sleep apnoea/hypopnoea syndrome (OSAHS; see

recommendation 1.1.1) or

- features of nocturnal hypoventilation such as:
 - waking headaches
 - peripheral oedema
 - hypoxaemia (arterial oxygen saturation less than 94% on air)
 - unexplained polycythaemia.

For a short explanation of why the committee made this recommendation and how it might affect practice, see the rationale and impact section on when to suspect OHS.

Full details of the evidence and the committee's discussion are in evidence review A: when to suspect OSAHS, OHS and COPD–OSAHS overlap syndrome.

Assessment scales for suspected OHS

- 2.1.2 Use the Epworth Sleepiness Scale in the preliminary assessment of sleepiness in people with suspected OHS.
- 2.1.3 Do not use the Epworth Sleepiness Scale alone to determine if referral is needed, because not all people with OHS have excessive sleepiness.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on assessment scales for suspected OHS.

Full details of the evidence and the committee's discussion are in evidence review B: assessment tools for people with suspected OSAHS, OHS or COPD–OSAHS overlap syndrome.

2.2 Prioritising people for rapid assessment by a

sleep service

See also [recommendation 4.1.1 on providing information for people with suspected OHS who are being referred to a sleep service](#).

2.2.1 When referring people with suspected OHS to a sleep service, include the following information in the referral letter to facilitate rapid assessment:

- results of the person's sleepiness score
- how sleepiness affects the person
- BMI
- comorbidities
- occupational risk
- oxygen saturation and blood gas values, if available
- any history of emergency admissions and acute non-invasive ventilation.

2.2.2 Within the sleep service, prioritise people with suspected OHS for rapid assessment if any of the following apply:

- they have severe hypercapnia (PaCO_2 [partial pressure of carbon dioxide] over 7.0 kPa when awake)
- they have hypoxaemia (arterial oxygen saturation less than 94% on air)
- they have acute ventilatory failure
- they have a vocational driving job
- they have a job for which vigilance is critical for safety
- they are pregnant
- they have unstable cardiovascular disease, for example, poorly controlled arrhythmia, nocturnal angina, heart failure or treatment-resistant hypertension

- they are undergoing preoperative assessment for major surgery
- they have non-arteritic anterior ischaemic optic neuropathy.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on prioritising people for rapid assessment by a sleep service](#).

Full details of the evidence and the committee's discussion are in [evidence review C: prioritisation for rapid assessment at a sleep centre of people with suspected OSAHS, OHS or COPD–OSAHS overlap syndrome](#).

2.3 Diagnostic tests for OHS

See also [section 4 on providing information for people who have been diagnosed with OHS](#).

Diagnosing OHS and assessing ventilatory failure

- 2.3.1 Consider measuring serum venous bicarbonate as a preliminary test if the pre-test probability of OHS is low. If bicarbonate levels are below 27 mmol/litre, OHS is unlikely.
- 2.3.2 Measure arterial or arterialised capillary blood gases when the person with suspected OHS is awake, to diagnose OHS and assess the extent of chronic ventilatory failure.
- 2.3.3 Do not delay treatment for acute ventilatory failure to carry out further investigations for OHS.

Diagnosing the presence of OSAHS or nocturnal hypoventilation in people with OHS

- 2.3.4 Offer respiratory polygraphy, either in hospital or at home, to determine the

presence of OSAHS in people with suspected OHS.

- 2.3.5 Consider adding transcutaneous CO₂ monitoring during sleep to respiratory polygraphy in people with suspected OHS to determine the extent of nocturnal hypoventilation and provide additional information to guide treatment.
- 2.3.6 Do not use oximetry alone to determine the presence of OSAHS in people with OHS.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on diagnostic tests for OHS](#).

Full details of the evidence and the committee's discussion are in [evidence review D: diagnostic tests for OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

2.4 Lifestyle advice for OHS

- 2.4.1 Discuss appropriate lifestyle changes with all people with OHS. Provide support and information on losing weight, stopping smoking, reducing alcohol intake and improving sleep hygiene tailored to the person's needs and in line with the NICE guidelines on:
- [tobacco: preventing uptake, promoting quitting and treating dependence](#)
 - [overweight and obesity management](#)
 - [alcohol-use disorders: prevention](#) (in particular, recommendations on screening, brief advice and extended brief interventions for adults).

For a short explanation of why the committee made this recommendation and how it might affect practice, see the [rationale and impact section on lifestyle advice for OHS](#).

2.5 Treatments for OHS

See also [section 4 on providing information for people starting treatment for OHS](#).

CPAP and non-invasive ventilation

People with OHS who do not have acute ventilatory failure

- 2.5.1 Offer continuous positive airway pressure (CPAP) to people with OHS and severe OSAHS as first-line treatment.
- 2.5.2 Offer non-invasive ventilation as an alternative to CPAP for people with OHS and severe OSAHS if symptoms do not improve, hypercapnia persists, apnoea–hypopnoea index (AHI) or oxygen desaturation index (ODI) are not sufficiently reduced or CPAP is poorly tolerated.
- 2.5.3 Consider non-invasive ventilation for people with OHS and nocturnal hypoventilation who do not have OSAHS, or in whom OSAHS is not severe.
- 2.5.4 Consider heated humidification in addition to CPAP for people with OHS and OSAHS and upper airway side effects such as nasal and mouth dryness, and CPAP-induced rhinitis.

People with OHS and acute ventilatory failure

- 2.5.5 Offer non-invasive ventilation to people with OHS with acute ventilatory failure:
 - If hypercapnia persists, consider continuing and further optimising non-invasive ventilation.
 - If hypercapnia resolves, consider stopping non-invasive ventilation and monitoring the response.
- 2.5.6 After a person with OHS and acute ventilatory failure has been stabilised on non-invasive ventilation with control of hypercapnia, consider:
 - stopping non-invasive ventilation and carrying out respiratory polygraphy **and**
 - a trial of CPAP in people with frequent episodes of obstructive apnoea and minimal hypoventilation.

If the person decompensates after stopping non-invasive ventilation, offer to restart non-invasive ventilation.

Reducing the risk of transmission of infection when using CPAP or non-invasive ventilation

- 2.5.7 Be aware that CPAP and non-invasive ventilation are aerosol-generating procedures and, if there is a risk of airborne infection, such as COVID-19, appropriate infection control precautions should be taken. These may include setting up the device at home by video consultation or with precautions in hospital.

For more information, see the [UK government guidance on COVID-19: infection prevention and control](#) and local guidance.

Oxygen therapy

- 2.5.8 Consider supplemental oxygen therapy with CPAP or non-invasive ventilation for people with OHS who remain hypoxaemic despite optimal control of nocturnal hypoventilation and AHI on CPAP or non-invasive ventilation, and address any additional underlying causes of hypoxaemia where possible.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on treatments for OHS](#).

Full details of the evidence and the committee's discussion are in [evidence review F: positive airway pressure therapy variants for OSAHS, OHS and COPD–OSAHS overlap syndrome](#) and [evidence review I: oxygen therapy](#).

2.6 Managing rhinitis in people with OHS

- 2.6.1 Assess people with nasal congestion and OHS for underlying allergic or

vasomotor rhinitis.

2.6.2 If rhinitis is diagnosed in people with OHS, offer initial treatment with:

- topical nasal corticosteroids or antihistamines for allergic rhinitis **or**
- topical nasal corticosteroids for vasomotor rhinitis.

2.6.3 For people with OHS and persistent rhinitis, consider referral to an ear, nose and throat specialist if:

- symptoms do not improve with initial treatment **or**
- anatomical obstruction is suspected.

2.6.4 Be aware that:

- rhinitis can affect people's tolerance to CPAP and non-invasive ventilation but changing from a nasal to an orofacial mask and adding humidification can help (see [recommendation 2.5.4 on heated humidification for OHS and OSAHS](#))
- CPAP and non-invasive ventilation can worsen or cause rhinitis and nasal congestion.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on managing rhinitis in people with OHS](#).

Full details of the evidence and the committee's discussion are in [evidence review K: rhinitis](#).

2.7 Follow-up and monitoring for people with OHS

2.7.1 Tailor follow-up to the person's overall treatment plan, which may include lifestyle changes and treating comorbidities. See the [recommendations on tailoring healthcare services for each patient in the NICE guideline on patient experience](#)

in adult NHS services.

Follow-up for people using CPAP or non-invasive ventilation

- 2.7.2 Offer face-to-face, video or phone consultations, including review of telemonitoring data (if available), to people with OHS having non-invasive ventilation or CPAP. This should include:
- an initial consultation within 1 month **and**
 - subsequent follow-up according to the person's needs and until optimal control of symptoms, AHI or ODI, oxygenation and hypercapnia is achieved.
- 2.7.3 When non-invasive ventilation or CPAP (with or without oxygen therapy) has been optimised for people with OHS and their symptoms are controlled, consider 6-monthly to annual follow-up according to the person's needs.
- 2.7.4 Offer people with OHS having non-invasive ventilation or CPAP access to a sleep and ventilation service for advice, support and equipment between follow-up appointments.

Follow-up for drivers with excessive sleepiness

- 2.7.5 Ensure follow-up is in line with Driver and Vehicle Licensing Agency guidance on assessing fitness to drive.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on follow-up for people with OHS.

Full details of the evidence and the committee's discussion are in evidence review L: monitoring.

Monitoring treatment efficacy for people with OHS

- 2.7.6 Assess the effectiveness of treatment with CPAP or non-invasive ventilation in people with OHS by reviewing the following:
- OHS symptoms, including the [Epworth Sleepiness Scale](#) and vigilance, for example, when driving
 - severity of OSAHS, using AHI or ODI
 - improvement in oxygenation and hypercapnia while awake and asleep
 - adherence to therapy
 - telemonitoring or download information from the device (if available).
- 2.7.7 Explore with the person their understanding and experience of treatment, and review the following:
- mask type and fit, including checking for leaks
 - nasal and mouth dryness, and the need for humidification
 - other factors affecting sleep disturbance such as insomnia, restless legs and shift work
 - sleep hygiene
 - cleaning and maintenance of equipment.
- 2.7.8 For people with OHS having supplemental oxygen therapy, review whether this is still needed after treatment with non-invasive ventilation or CPAP has been optimised.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on monitoring treatment efficacy for people with OHS](#).

Full details of the evidence and the committee's discussion are in [evidence review M: demonstration of efficacy](#).

2.8 Supporting adherence to treatment for OHS

- 2.8.1 Offer people with OHS educational or supportive interventions, or a combination of these, tailored to the person's needs and preferences, to improve adherence to CPAP and non-invasive ventilation.
- 2.8.2 Interventions to support adherence to treatment for OHS should be given by trained specialist staff when treatment is started and as needed at follow-up.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on supporting adherence to treatment for OHS](#).

Full details of the evidence and the committee's discussion are in [evidence review N: adherence](#).

3 COPD–OSAHS overlap syndrome

People have the right to be involved in discussions and make informed decisions about their care, as described in [NICE's information on making decisions about your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

Please note that the following guidance from the Driver and Vehicle Licensing Agency (DVLA) and the UK government is relevant to these recommendations:

- [DVLA guidance on assessing fitness to drive: a guide for medical professionals](#)
- [DVLA guidance on excessive sleepiness and driving](#)
- [UK government guidance on COVID-19: infection prevention and control](#).

COPD–OSAHS overlap syndrome occurs in people who have both chronic obstructive pulmonary disease (COPD) and obstructive sleep apnoea/hypopnoea syndrome (OSAHS). The combined effect of these conditions on ventilatory load, gas exchange, comorbidities and quality of life is greater than either condition alone.

Recommendations in this guideline cover assessment and treatment of OSAHS in people with COPD. For recommendations on the diagnosis and management of COPD, see the [NICE guidelines on chronic obstructive pulmonary disease in over 16s and chronic obstructive pulmonary disease \(acute exacerbation\): antimicrobial prescribing](#).

3.1 Initial assessment for COPD–OSAHS overlap syndrome

When to suspect COPD–OSAHS overlap syndrome

3.1.1 Take a sleep history and assess people for COPD–OSAHS overlap syndrome if they have confirmed COPD with:

- features of OSAHS (see [recommendation 1.1.1](#)) or
- features of [nocturnal hypoventilation](#) such as:
 - waking headaches
 - peripheral oedema
 - hypoxaemia (arterial oxygen saturation less than 94% on air)
 - unexplained polycythaemia.

For a short explanation of why the committee made this recommendation and how it might affect practice, see the [rationale and impact section on when to suspect COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review A: when to suspect OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

Assessment scales and tests for suspected COPD–OSAHS overlap syndrome

3.1.2 When assessing people with suspected COPD–OSAHS overlap syndrome:

- Use the [Epworth Sleepiness Scale](#) in the preliminary assessment of sleepiness.
- Consider using the [STOP-Bang Questionnaire](#), as well as the Epworth Sleepiness Scale.

- 3.1.3 Do not use the Epworth Sleepiness Scale alone to determine if referral is needed, because not all people with COPD–OSAHS overlap syndrome have excessive sleepiness.
- 3.1.4 Offer spirometry to assess the severity of COPD in people with suspected COPD–OSAHS overlap syndrome (see the [recommendations on spirometry in NICE's guideline on chronic obstructive pulmonary disease in over 16s](#)).

Reducing the risk of transmission of infection when using spirometry

- 3.1.5 Be aware that spirometry is an aerosol-generating procedure and, if there is a risk of airborne infection, such as COVID-19, appropriate infection control precautions should be taken.

For more information, see the [UK government guidance on COVID-19: infection prevention and control](#) and local guidance.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on assessment scales and tests for suspected COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review B: assessment tools for people with suspected OSAHS, OHS or COPD–OSAHS overlap syndrome](#).

3.2 Prioritising people for rapid assessment by a sleep service

See also [recommendation 4.1.1 on providing information for people with suspected COPD–OSAHS overlap syndrome who are being referred to a sleep service](#).

- 3.2.1 When referring people with suspected COPD–OSAHS overlap syndrome to a sleep service, include the following information in the referral letter to facilitate rapid assessment:

- results of the person's sleepiness score
- how sleepiness affects the person
- body mass index (BMI)
- severity and frequency of exacerbations of COPD
- use of oxygen therapy at home
- comorbidities
- occupational risk
- oxygen saturation and blood gas values, if available
- any history of acute non-invasive ventilation.

3.2.2 Within the sleep service, prioritise people with suspected COPD–OSAHS overlap syndrome for rapid assessment if any of the following apply:

- they have severe hypercapnia (PaCO_2 [partial pressure of carbon dioxide] over 7.0 kPa when awake)
- they have hypoxaemia (arterial oxygen saturation less than 94% on air)
- they have acute ventilatory failure
- they have a vocational driving job
- they have a job for which vigilance is critical for safety
- they are pregnant
- they have unstable cardiovascular disease, for example, poorly controlled arrhythmia, nocturnal angina, heart failure or treatment-resistant hypertension
- they are undergoing preoperative assessment for major surgery
- they have non-arteritic anterior ischaemic optic neuropathy.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on prioritising people for rapid assessment by a sleep service](#).

Full details of the evidence and the committee's discussion are in [evidence review C: prioritisation for rapid assessment at a sleep centre of people with suspected OSAHS, OHS or COPD–OSAHS overlap syndrome](#).

3.3 Diagnostic tests for COPD–OSAHS overlap syndrome

See also [section 4 on providing information for people who have been diagnosed with COPD–OSAHS overlap syndrome](#).

Diagnosing ventilatory failure

- 3.3.1 Measure arterial or arterialised capillary blood gas when the person with suspected COPD–OSAHS overlap syndrome is awake, to assess for ventilatory failure.
- 3.3.2 Do not delay treatment for acute ventilatory failure to carry out further investigations for COPD–OSAHS overlap syndrome.

Diagnosing OSAHS or nocturnal hypoventilation in people with suspected COPD–OSAHS overlap syndrome

- 3.3.3 Offer respiratory polygraphy, either in hospital or at home, to diagnose OSAHS in people with suspected COPD–OSAHS overlap syndrome.
- 3.3.4 Consider adding transcutaneous carbon dioxide (CO₂) monitoring during sleep to respiratory polygraphy to provide additional information to guide treatment.
- 3.3.5 Do not use oximetry alone to diagnose OSAHS or nocturnal hypoventilation in

people with suspected COPD–OSAHS overlap syndrome.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on diagnostic tests for COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review D: diagnostic tests for OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

3.4 Lifestyle advice for COPD–OSAHS overlap syndrome

- 3.4.1 For people with COPD–OSAHS overlap syndrome, follow [recommendation 1.4.1 on lifestyle advice for people with OSAHS](#). Prioritise advice on stopping smoking and follow the [recommendations on smoking cessation in NICE's guideline on chronic obstructive pulmonary disease in over 16s](#).

3.5 Treatments for COPD–OSAHS overlap syndrome

See also [section 4 on providing information for people starting treatment for COPD–OSAHS overlap syndrome](#).

CPAP and non-invasive ventilation

- 3.5.1 Consider continuous positive airway pressure (CPAP) as first-line treatment for people with COPD–OSAHS overlap syndrome if they do not have severe hypercapnia (PaCO₂ of 7.0 kPa or less).
- 3.5.2 Consider non-invasive ventilation instead of CPAP for people with COPD–OSAHS overlap syndrome with nocturnal hypoventilation if they have severe hypercapnia (PaCO₂ greater than 7.0 kPa).

- 3.5.3 Consider heated humidification in addition to CPAP for people with COPD–OSAHS overlap syndrome and upper airway side effects such as nasal and mouth dryness, and CPAP-induced rhinitis.

Reducing the risk of transmission of infection when using CPAP or non-invasive ventilation

- 3.5.4 Be aware that CPAP and non-invasive ventilation are aerosol-generating procedures and, if there is a risk of airborne infection, such as COVID-19, appropriate infection control precautions should be taken. These may include setting up the device at home by video consultation or with precautions in hospital.

For more information, see [NICE's guideline on managing COVID-19](#), the [UK government guidance on COVID-19: infection prevention and control](#), and local guidance.

Oxygen therapy

- 3.5.5 Consider supplemental oxygen for people with COPD–OSAHS overlap syndrome if hypoxaemia persists once control of apnoea and nocturnal hypoventilation has been optimised by CPAP or non-invasive ventilation, and address any additional underlying causes of hypoxaemia where possible.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on treatments for COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review F: positive airway pressure therapy variants for OSAHS, OHS and COPD–OSAHS overlap syndrome](#) and [evidence review I: oxygen therapy](#).

3.6 Managing rhinitis in people with COPD–OSAHS

overlap syndrome

- 3.6.1 For people with COPD–OSAHS overlap syndrome, follow the [recommendations on managing rhinitis in people with OSAHS](#).

3.7 Follow-up and monitoring for people with COPD–OSAHS overlap syndrome

- 3.7.1 Tailor follow-up to the person's overall treatment plan, which may include lifestyle changes and treating comorbidities. It may also include discussions about care planning (for example, COPD exacerbation action plan and advance care planning) for those with severe COPD. See the [recommendations on self-management in the NICE guideline on chronic obstructive pulmonary disease in over 16s](#) and [tailoring healthcare services for each patient in the NICE guideline on patient experience in adult NHS services](#).

Follow-up for people using CPAP or non-invasive ventilation

- 3.7.2 Offer face-to-face, video or phone consultations, including review of [telemonitoring](#) data (if available), to people with COPD–OSAHS overlap syndrome having non-invasive ventilation or CPAP. This should include:
- an initial consultation within 1 month **and**
 - subsequent follow-up according to the person's needs and until optimal control of symptoms, [apnoea–hypopnoea index \(AHI\)](#) or [oxygen desaturation index \(ODI\)](#), oxygenation and hypercapnia is achieved.
- 3.7.3 When non-invasive ventilation or CPAP (with or without oxygen therapy) has been optimised for people with COPD–OSAHS overlap syndrome and their symptoms are controlled, consider 6-monthly to annual follow-up according to the person's needs.
- 3.7.4 Offer people with COPD–OSAHS overlap syndrome having non-invasive ventilation or CPAP access to a sleep and ventilation service for advice, support

and equipment between follow-up appointments.

Follow-up for drivers with excessive sleepiness

- 3.7.5 Ensure follow-up is in line with [Driver and Vehicle Licensing Agency guidance on assessing fitness to drive](#).

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on follow-up for people with COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review L: monitoring](#).

Monitoring treatment efficacy for people with COPD–OSAHS overlap syndrome

- 3.7.6 Assess the effectiveness of treatment with CPAP or non-invasive ventilation in people with COPD–OSAHS overlap syndrome by reviewing the following:
- symptoms of OSAHS and nocturnal hypoventilation, including the [Epworth Sleepiness Scale](#) and vigilance, for example, when driving
 - severity of OSAHS, using AHI or ODI
 - improvement in oxygenation and hypercapnia while awake and asleep
 - adherence to therapy
 - telemonitoring or download information from the device (if available).
- 3.7.7 Explore with the person their understanding and experience of treatment, and review the following:
- mask type and fit, including checking for leaks
 - nasal and mouth dryness, and need for humidification

- other factors affecting sleep disturbance such as insomnia, restless legs and shift work
- sleep hygiene
- cleaning and maintenance of equipment.

3.7.8 Be aware that some symptoms associated with COPD such as cough and wheeze, and certain medications such as theophyllines, may adversely affect sleep quality.

3.7.9 For people with COPD–OSAHS overlap syndrome having supplemental oxygen therapy, review whether this is still needed after treatment with non-invasive ventilation or CPAP has been optimised.

3.7.10 Consider stopping CPAP or non-invasive ventilation and using a symptom-management approach for people with COPD–OSAHS overlap syndrome who have severe COPD if, despite treatment optimisation, CPAP or non-invasive ventilation does not improve their symptoms or quality of life, or adds to the burden of therapy.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on monitoring treatment efficacy for people with COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review M: demonstration of efficacy](#).

3.8 Supporting adherence to treatment for COPD–OSAHS overlap syndrome

3.8.1 Offer people with COPD–OSAHS overlap syndrome educational or supportive interventions, or a combination of these, tailored to the person's needs and preferences, to improve adherence to CPAP and non-invasive ventilation.

- 3.8.2 Interventions to support adherence to treatment for COPD–OSAHS overlap syndrome should be given by trained specialist staff when treatment is started and as needed at follow-up.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on supporting adherence to treatment for COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review N: adherence](#).

4 Information for people with OSAHS, OHS or COPD–OSAHS overlap syndrome

When providing information, follow the recommendations on [enabling patients to actively participate in their care in NICE's guideline on patient experience in adult NHS services](#) and [putting shared decision making into practice in NICE's guideline on shared decision making](#).

- 4.1.1 For people with suspected obstructive sleep apnoea/hypopnoea syndrome (OSAHS), obesity hypoventilation syndrome (OHS) or chronic obstructive pulmonary disease–obstructive sleep apnoea/hypopnoea syndrome (COPD–OSAHS) overlap syndrome who are being referred to a sleep service, provide information on:
- the underlying causes of their condition
 - what [sleep studies](#) involve
 - why treatment is important
 - what treatments are available
 - the impact of excessive sleepiness on safe driving and occupational risk
 - the [Driver and Vehicle Licensing Agency \(DVLA\) guidance on excessive sleepiness and driving](#) and when there is a legal requirement for the person to notify the DVLA of their condition
 - lifestyle changes, including weight loss, increasing physical activity, and avoiding alcohol excess and sedatives before sleep
 - other sources of patient support.
- 4.1.2 For people who have been diagnosed with OSAHS, OHS or COPD–OSAHS overlap syndrome, repeat the information provided at referral (see recommendation 4.1.1) and give additional information on:
- choosing the best treatment for the person

- the practicalities of travel.

4.1.3 For people starting treatment with continuous positive airway pressure (CPAP) or non-invasive ventilation, provide information on:

- why it is used and how it works
- the benefits of continuing with treatment and advice on encouraging adherence
- how to get support for technical and clinical problems, including side effects, and obtain replacement masks and other parts
- different masks or other interface options, humidification and how to manage problems with masks
- how often to expect follow-up appointments
- how to clean and maintain the equipment
- taking short breaks from treatment
- making arrangements for travelling with CPAP or non-invasive ventilation.

4.1.4 Advise people using CPAP and non-invasive ventilation that these are aerosol-generating procedures and they should take appropriate precautions if there is a risk that they may have an airborne infection such as COVID-19.

For more information, see the [UK government guidance on COVID-19: infection prevention and control](#) and local guidance.

4.1.5 For people starting treatment with a mandibular advancement splint, provide information on:

- why they are used and how they work
- the benefits of continuing with treatment, and advice on encouraging adherence
- possible short-term side effects, such as mild discomfort, hypersalivation and altered bite

- possible long-term side effects, such as problems with dental occlusion
- adjusting the device to ensure maximum benefit
- how to clean and maintain the device
- maintaining good oral health
- who to contact for help with problems, for example, if the device breaks or the fit becomes poor
- how often to expect follow-up appointments.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on information for people with OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review O: information and support](#).

Terms used in this guideline

This section defines terms that have been used in a particular way for this guideline.

Apnoea

A complete pause in breathing, defined as lasting 10 seconds or more on a sleep study. An obstructive apnoea is caused by blockage of the upper airway, whereas a central apnoea occurs when there is no respiratory effort.

Apnoea–hypopnoea index (AHI)

The number of apnoeas and hypopnoeas per hour, measured during a multi-channel sleep study.

Hypopnoea

A reduction in breathing, defined as lasting for 10 seconds or more on a sleep study. An obstructive hypopnoea is caused by partial obstruction of the upper airway.

Mandibular advancement splint

An oral device used to treat sleep-related breathing disorders. It is worn over the upper and lower teeth, and holds the lower jaw forward, thereby increasing space at the back of the mouth and decreasing snoring and sleep apnoea. A custom-made mandibular advancement splint is formed from a dental impression taken by a dentist, which is used to make the splint in a laboratory. It is then fitted by a suitably trained general dental practitioner. A semi-customised mandibular advancement splint is formed using a dental impression taken by the patient, which they send to the manufacturer to make the splint.

Nocturnal hypoventilation

Decreased breathing or under breathing during sleep, which can lead to varying severities of ventilatory failure (low oxygen levels and raised carbon dioxide). It can be caused by

obesity, underlying lung disease, neuromuscular weakness and some medications such as opiates. Severe hypercapnia can be caused by nocturnal hypoventilation.

Oxygen desaturation index (ODI)

The ODI is defined as the number of episodes of oxygen desaturation per hour of sleep.

Positional modifier

An intervention to encourage patients not to sleep on their backs. There are several devices available such as the tennis ball technique, lumbar or abdominal binders, semi-rigid backpacks, full-length pillows and electronic sleep position trainers.

Positional OSAHS

A type of obstructive sleep apnoea/hypopnoea syndrome (OSAHS) that is affected by the person's sleep position. People with positional OSAHS have an apnoea–hypopnoea index (AHI) at least twice as high when lying face up (supine) as lying on their side (laterally).

Severity of OSAHS

This is determined using the [AHI value](#), as follows:

- Mild OSAHS: AHI of 5 or more to less than 15
- Moderate OSAHS: AHI of 15 or more to less than 30
- Severe OSAHS: AHI of 30 or more.

Sleep study

A test used to diagnose sleep disorders by recording multiple channels during sleep, such as brain activity, breathing rate, blood oxygen level, heart rate, and eye and leg movements. There are several different types of sleep study:

- oximetry measures arterial oxygen saturation and heart rate while the person is asleep

- respiratory polygraphy includes at least 4 channels such as oximetry, breathing rate, apnoeas and hypopnoeas, snoring and body position
- polysomnography, which is more detailed and includes respiratory polygraphy measures combined with assessment of sleep quality and duration using additional brain activity, eye movement and muscle tone signals.

Telemonitoring

The use of information and communication technologies to monitor patients remotely and transmit data related to their health. It is used to provide information including respiratory events, pressure requirements, mask leak and adherence.

Recommendations for research

The guideline committee has made the following key recommendations for research.

Key recommendations for research

1 Auto- and fixed-level CPAP for managing mild OSAHS

What is the clinical and cost effectiveness of auto- and fixed-level continuous positive airway pressure (CPAP) for managing mild obstructive sleep apnoea/hypopnoea syndrome (OSAHS)?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on treatments for mild OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review F: positive airway pressure therapy variants for OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

2 Auto- and fixed-level CPAP for managing moderate and severe OSAHS

What is the clinical and cost effectiveness of auto- and fixed-level continuous positive airway pressure (CPAP) for managing moderate and severe OSAHS?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on treatments for moderate and severe OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review F: positive airway pressure therapy variants for OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

3 Interventions to improve CPAP adherence

Which interventions, including behavioural interventions, are most clinically and cost effective to improve adherence to CPAP in people with OSAHS, obesity hypoventilation syndrome (OHS) and COPD–OSAHS (chronic obstructive pulmonary disease–OSAHS) overlap syndrome who have difficulty using CPAP?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on supporting adherence to treatment for OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review N: adherence](#).

4 Mandibular advancement splints for mild symptomatic OSAHS

In mild symptomatic OSAHS, which clinical and physiological phenotypes predict treatment response to customised mandibular advancement splints?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on treatments for mild OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review G: oral devices](#).

5 Mandibular advancement splints for moderate OSAHS

In moderate OSAHS, which clinical and physiological phenotypes predict treatment response to customised mandibular advancement splints?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on treatments for moderate and severe OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review G: oral devices](#).

6 Mandibular advancement splints for severe OSAHS

What is the clinical and cost effectiveness of mandibular advancement splints for managing severe OSAHS?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on treatments for moderate and severe OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review G: oral devices](#).

7 Treatment for people with COPD–OSAHS overlap syndrome

What is the optimal treatment for people with COPD–OSAHS overlap syndrome: non-invasive ventilation or CPAP?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on treatments for COPD–OSAHS overlap syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review F: positive airway pressure therapy variants for OSAHS, OHS and COPD–OSAHS overlap syndrome](#).

Other recommendations for research

8 Upper airway surgery in people unable to tolerate or adhere to CPAP

What is the clinical and cost effectiveness of upper airway surgical interventions for people with OSAHS who are unable to tolerate or adhere to CPAP?

For a short explanation of why the committee made the recommendation for research, see the [rationale section on surgery for OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review J: surgery](#).

9 Oxygen therapy for OSAHS

What is the clinical and cost effectiveness of nocturnal oxygen compared with placebo in people with OSAHS who are unable to tolerate CPAP?

For a short explanation of why the committee made this recommendation for research and how it might affect practice, see the [rationale section on oxygen therapy for OSAHS](#).

Full details of the evidence and the committee's discussion are in [evidence review I: oxygen therapy](#).

Rationale and impact

These sections briefly explain why the committee made the recommendations and how they might affect practice.

When to suspect OSAHS

[Recommendations 1.1.1 and 1.1.2](#)

Why the committee made the recommendations

There was limited evidence for identifying who to assess for obstructive sleep apnoea/hypopnoea syndrome (OSAHS), so the committee also used their clinical knowledge and experience to make the recommendations.

The committee agreed that, after taking a sleep history, further assessment for OSAHS should be carried out in people presenting with common symptoms and features of OSAHS, such as unexplained excessive sleepiness, snoring, apnoeas observed during sleep and choking during sleep, but that a broader range of symptoms should also be recognised, such as sleep fragmentation, insomnia, and fatigue in people without excessive sleepiness. The committee agreed that a single symptom alone, such as snoring, is not sufficient for further investigation and that 2 or more features should be identified to warrant assessment. Based on evidence and experience, the committee listed conditions associated with OSAHS that should alert healthcare professionals to the possibility of OSAHS.

How the recommendations might affect practice

The recommendations aim to raise awareness of symptoms and associated conditions that should raise suspicion of OSAHS, as well as prompting assessment. This could increase the number of people being assessed and referred to sleep services.

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Assessment scales for suspected OSAHS

Recommendations 1.1.3 and 1.1.4

Why the committee made the recommendations

The Epworth Sleepiness Scale is intended to assess for sleepiness rather than to diagnose OSAHS, and the limited evidence reflected this, showing that it performed poorly both for sensitivity and specificity in diagnosing OSAHS. The committee noted that some people with OSAHS do not have excessive sleepiness and that not all healthcare professionals are aware of this. However, they agreed that it has a useful role in assessment and monitoring, and noted that when healthcare professionals are requested by the Driver and Vehicle Licensing Agency (DVLA) to complete assessment of a driver with OSAHS, this includes the Epworth Sleepiness Scale. They therefore agreed that it should be used, but not as the sole means of assessing the presence of OSAHS or as the sole basis for referral.

Limited evidence showed that the STOP-Bang Questionnaire had high sensitivity and low specificity for diagnosing OSAHS. Sensitivity is a priority for questionnaires used for initial assessment. The committee had some concerns about its accuracy in people with less common presentations and in women, but agreed that it could have a role in assessment alongside the Epworth Sleepiness Scale to inform the preliminary understanding of the person's symptoms and concerns. The Epworth questionnaire is used to assess only sleepiness whereas the STOP-Bang Questionnaire is used to assess risk of having OSAHS and includes parameters such as snoring, tiredness, history of high blood pressure, body mass index (BMI), age, neck size and gender. With this in mind, the committee agreed that the Epworth questionnaire should be used and the STOP-Bang Questionnaire could also be considered for initial assessment.

How the recommendations might affect practice

The recommended questionnaires are widely used in current practice, so the recommendations are not expected to involve a change in practice.

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Prioritising people for rapid assessment by a sleep service

Recommendations 1.2.1 and 1.2.2

Why the committee made the recommendations

There was limited evidence available on who to prioritise for assessment in a sleep service, and the committee noted that service provision and waiting times vary across sleep services and regions in England. Therefore, the committee used their knowledge and experience to identify groups that would benefit most from prompt assessment and treatment.

The committee agreed that sleep services should prioritise access to a sleep study and treatment for people in whom vigilance and alertness are vital to occupational safety, particularly those with problematic sleepiness, and to people with pre-existing conditions who are at increased risk of adverse events. They agreed that sleep services should aim to fast-track priority groups to be seen as soon as possible.

The committee discussed the effect of OSAHS on work performance and safety, and how it could increase the risk of work accidents in safety-sensitive occupations. People with a wide range of jobs or activities could be affected, for example, drivers, train drivers, pilots, heavy machinery operators, surgeons and people caring for vulnerable children or adults. The committee noted that [DVLA guidance on assessing fitness to drive](#) recommends that drivers with suspected or confirmed OSAHS and excessive sleepiness having, or likely to have, an adverse impact on driving must not drive until there is satisfactory symptom control. Control of symptoms is likely to need assessment and treatment from a sleep specialist.

The committee noted that untreated OSAHS is recognised as a risk factor for treatment-resistant hypertension and recurrence of atrial flutter in people who have had treatment with ablative therapy. Therefore, it was agreed that people with unstable cardiovascular disease should be prioritised because of the risks of worsening cardiovascular disease or adverse events.

The committee agreed that priority should be given to pregnant women because OSAHS in pregnancy is associated with increased risks for the mother and baby.

The committee agreed that people with a high probability of OSAHS who need major surgery should be prioritised to avoid delaying surgery.

The committee also agreed that the risk of sudden blindness in patients with non-arteritic anterior ischaemic optic neuropathy warrants priority assessment because of its possible association with OSAHS.

To ensure that people are prioritised appropriately by sleep services and to allow fast-tracking directly to a sleep study, the committee agreed on key details, based on their experience, that should be included in referral letters.

How the recommendations might affect practice

In current practice, specific groups are not always prioritised for assessment, so there is likely to be a change in practice for some providers. There is increasing pressure on sleep services, and offering higher priority to some groups may delay sleep studies for other people. Planning for and providing rapid-access sleep studies may help to reduce the pressure on services, with triage of referrals allowing people to be fast-tracked directly to a diagnostic study.

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Diagnostic tests for OSAHS

[Recommendations 1.3.1 to 1.3.6](#)

Why the committee made the recommendations

The evidence on diagnostic tests for OSAHS was not consistent. The studies reviewed looked at diagnostic devices with a variety of monitoring channels and included different patient groups. The committee also noted that diagnostic equipment has evolved and improved over time. The committee used their clinical knowledge and experience supported by the published evidence and by the economic model developed for this guideline to make the recommendations.

Home respiratory polygraphy was more cost effective than both hospital (inpatient) respiratory polygraphy and home oximetry. The committee noted that respiratory

polygraphy has the added benefit of aiding the diagnosis of other conditions such as central sleep apnoea and nocturnal hypoventilation and it is better than oximetry alone in identifying artefacts in the recordings.

The use of oximetry alone, or oximetry followed by home respiratory polygraphy if initial oximetry is negative, was less cost effective than initial home respiratory polygraphy. However, diagnostic strategies incorporating oximetry are still used in practice, for example, by services with limited availability of home polygraphy equipment, and the committee recognised that it might take time and significant resources to change practice. They noted that when suspicion of OSAHS is low, a normal oximetry result can provide further evidence to rule out diagnosis. The committee agreed that oximetry could still be an option and that this would help to avoid unacceptable delays in diagnosis where there is a lack of access to home respiratory polygraphy.

The committee also highlighted the potential problems of relying on oximetry for diagnosis. Oximetry may be particularly inaccurate in people with conditions such as heart failure or chronic lung disease, which can result in desaturation without the presence of OSAHS, although they agreed that a negative test result is still useful. In addition, oximetry cannot reliably distinguish between obstructive or central apnoeas and nocturnal hypoventilation, which is important to help determine treatment.

The option to do the sleep study in hospital was also considered important by the committee. Hospital polygraphy may sometimes be needed when investigating alternative diagnoses alongside OSAHS, because extra monitoring channels can be used. It might also be an option if home respiratory polygraphy or home oximetry are impractical, for example, for people who need help with the monitoring equipment, or who need to travel long distances to pick up and return devices, or when a number of inpatient investigations need to be combined.

The committee agreed that further investigation with polysomnography, which is more accurate and more expensive than respiratory polygraphy, should be an option to provide more detail on sleep fragmentation and respiratory events for people with symptoms of OSAHS who have a negative respiratory polygraphy or oximetry result but continue to have suggestive symptoms. This may help distinguish between OSAHS and other disorders such as narcolepsy, rapid eye movement sleep behaviour disorder, periodic limb movement disorders, idiopathic hypersomnolence or parasomnias, which are suspected as a more likely diagnosis for the person's symptoms; or help diagnose these disorders when they are suspected in addition to OSAHS.

How the recommendations might affect practice

Current practice is variable, with some sleep services offering oximetry as the first-line test and others offering home respiratory polygraphy. The recommendations will reduce this variation by encouraging the use of home respiratory polygraphy over home oximetry. Some services will need to provide more home respiratory polygraphy equipment and fewer home oximetry devices, but improved testing should lead to fewer repeat tests and optimal treatment. The option to use home oximetry as an alternative to respiratory polygraphy will lessen the impact on resources as practice changes.

The use of polysomnography for those who still have symptoms despite negative respiratory polygraphy results reflects current practice for this small population.

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Lifestyle advice for all severities of OSAHS

[Recommendation 1.4.1](#)

Why the committee made the recommendation

Evidence for lifestyle advice was not reviewed because it is covered by other NICE guidelines.

The committee agreed that all people with OSAHS should discuss lifestyle changes with their healthcare professional. This should be tailored to the person's needs and the chosen treatment method. It may include advice on weight loss, preventing excess weight gain, stopping smoking and reducing alcohol intake, as appropriate.

Lifestyle changes are important because obesity increases the prevalence and severity of OSAHS, smoking causes upper airway inflammation (which can exacerbate symptoms), and excess alcohol before sleep reduces upper airway tone (increasing apnoeas) and reduces sleep quality. Advice on sleep hygiene may include ensuring adequate sleep time, avoiding caffeine and stimulants that interfere with sleep before bedtime, exercising regularly, having a quiet, comfortable, darkened bedroom, and winding down before sleep.

How the recommendation might affect practice

Lifestyle advice is widely used in current practice, so the recommendations are not expected to involve a change in practice.

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Treatments for mild OSAHS

[Recommendations 1.5.1 to 1.5.8](#)

Why the committee made the recommendations

Lifestyle advice alone

From their experience, the committee agreed that for many people with mild OSAHS who have no symptoms or symptoms that do not affect usual daytime activities, lifestyle changes alone can prevent OSAHS worsening and improve their quality of life. Lifestyle and sleep hygiene advice should be tailored to the person's circumstances. The committee noted that people without symptoms may come to the attention of a specialist because their partner has witnessed apnoeas and overt snoring.

Continuous positive airway pressure (CPAP)

For people with mild OSAHS whose symptoms affect their quality of life and usual daytime activities, the evidence suggested that CPAP was more clinically and cost effective than conservative management (including lifestyle changes and sleep hygiene). However, the quality of the evidence means that there is some uncertainty about the cost effectiveness. CPAP was found to be beneficial in improving sleepiness, fatigue, vitality and quality of life, which confirmed the committee's experience that there are benefits to giving CPAP to people with symptomatic mild OSAHS. Although some people could try lifestyle modification first, they noted that these changes take time to work and may not always be effective.

Delaying offering CPAP to people with any of the priority factors for rapid referral (listed in [recommendation 1.2.1](#)) could adversely affect quality of life, associated medical conditions or the person's ability to carry out their work, by failing to control their symptoms. The

committee agreed that, in their experience, offering CPAP to these groups helped control their symptoms and reduced the risks described in the rationale section for prioritising people for rapid assessment by a sleep service. Therefore, the committee agreed that, for these people, CPAP should be offered as a first-line treatment alongside lifestyle changes, as soon as mild OSAHS is diagnosed. They also agreed that CPAP would be beneficial to control symptoms in people for whom lifestyle changes alone are unsuccessful or are not appropriate.

The committee also discussed the benefits of telemonitoring, described in more detail in the rationale section on follow-up for people with OSAHS. They agreed that the costs varied between sleep centres and, in the committee's experience, telemonitoring is included in the price of the machine for 12 months. Based on this, the committee recommended it should be offered alongside CPAP for up to 12 months, and considered beyond 12 months if optimal control of symptoms and apnoea–hypopnoea index (AHI) has not been achieved, or to help with solving problems that people with OSAHS might experience.

Telemonitoring has allowed remote assessment of patients during the coronavirus pandemic and has become a standard follow-up option in most sleep services. This use is likely to continue long term, because it is convenient for patients, enables them to assess progress themselves and allows access to efficacy and adherence data whenever needed, for example, for problem solving, routine follow-up and to complete DVLA reports.

The evidence showed fixed-level CPAP and auto-CPAP to be equally effective, and auto-CPAP to be more costly. Therefore, the committee agreed to recommend fixed-level CPAP as the first-choice treatment. However, some people, particularly those in whom high pressures are only needed part of the time, find auto-CPAP more comfortable and effective than fixed-level CPAP. For others, telemonitoring may not be possible because of technological constraints such as the lack of availability of internet or poor internet connection. The committee agreed that auto-CPAP should be an option in these cases. The committee were also aware that some hospitals get significant discounts on auto-CPAP devices, which might make them more cost effective. Therefore, the committee agreed that if auto-CPAP can be purchased and administered at the same or lower cost than fixed-level CPAP, auto-CPAP could be considered. Given the uncertainty about the cost-effectiveness between auto- and fixed-level CPAP the committee made recommendations for research to help inform future guidelines.

Based on their experience of current practice, the committee agreed that using

humidification with CPAP in people with nasal symptoms can reduce side effects associated with upper airway dryness and this may improve adherence and treatment effectiveness.

Mandibular advancement splints

There was very little evidence for non-customised oral devices in people with mild OSAHS. Most of the evidence was for customised mandibular advancement splints and no evidence was found for tongue-retaining devices or tongue-stabilising devices. One study showed little benefit of mandibular advancement splints compared with no treatment in people with mild symptomatic OSAHS, but the committee agreed that the duration of the study was not sufficient for the true benefit to be assessed. Indirect evidence from studies in people with moderate OSAHS did show clinical benefit compared with placebo, and also showed better ease of use and patient preference scores than for CPAP.

An economic analysis showed that CPAP was slightly more cost effective than customised mandibular advancement splints, but the committee agreed the difference was small and they did not want to exclude these devices as an option, bearing in mind that some people find CPAP unacceptable. Based on this and their experience, the committee agreed that mandibular advancement splints should be considered as a treatment for people with mild OSAHS who have symptoms that affect their usual daytime activities if they are unable to tolerate or decline to try CPAP.

The evidence was unclear about the best type of mandibular advancement splint, but from their experience, the committee agreed that devices that are custom made and fitted by a suitably trained dentist are superior to semi-customised and ready-made (also called 'boil and bite') splints. Despite higher initial costs to make and fit, customised devices are more durable and longer lasting than the other devices. They are also preferred by patients. Semi-customised devices also last longer than ready-made devices and are cheaper than customised devices. Both customised and semi-customised devices were shown to be more cost effective than ready-made devices.

Semi-customised devices may be inappropriate for people with active periodontal disease or untreated dental decay, few or no teeth and for people with generalised tonic-clonic seizures. Experienced specialist care is needed to use these devices in people with few or no teeth. Mandibular advancement splints are not suitable for people under 18 because they may adversely affect development of dentition.

The committee observed that careful patient selection is vital and further research is needed to determine which patients with mild OSAHS would benefit most from mandibular advancement splint therapy. They developed a [recommendation for research on treating mild OSAHS with a mandibular advancement splint](#) to inform future guidance.

How the recommendations might affect practice

Some people with mild OSAHS currently use CPAP, for example, people with symptoms that affect their ability to do daily activities, and when other treatment options and lifestyle advice have been unsuccessful or are considered inappropriate. It is expected that there will be increased uptake of CPAP for mild OSAHS, and therefore a resource increase to the NHS from this recommendation, especially as the estimate of prevalence of mild OSAHS has increased, and more people are referred and diagnosed. Some sleep services currently using auto-CPAP may switch to fixed-level CPAP for new patients starting CPAP, which is likely to be cost saving.

Some people with mild OSAHS currently use mandibular advancement splints. Many of these will be less effective ready-made devices that people have bought themselves. It is expected that there will be increased uptake of semi-customised and customised mandibular advancement splints and therefore a resource increase from this recommendation. NHS provision of dental services producing mandibular advancement splints is currently limited. Mandibular advancement splints need replacing at regular intervals and people using them need follow-up to assess efficacy.

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Treatments for moderate and severe OSAHS

[Recommendations 1.6.1 to 1.6.7](#)

Why the committee made the recommendations

CPAP for moderate and severe OSAHS

The [NICE technology appraisal guidance on continuous positive airway pressure for the treatment of obstructive sleep apnoea/hypopnoea syndrome](#) recommends CPAP as a treatment option for moderate and severe OSAHS.

The committee discussed the benefits of telemonitoring, described in more detail in the rationale section on follow-up for people with OSAHS. They agreed that the costs varied between sleep centres and, in the committee's experience, telemonitoring is included in the price of the machine for 12 months. Based on this, they recommend it should be offered alongside CPAP for up to 12 months, and considered beyond 12 months if optimal control of symptoms and AHI has not been achieved, or to help with solving problems that people with OSAHS might experience.

Telemonitoring has allowed remote assessment of patients during the coronavirus pandemic and has become a standard follow-up option in most sleep services. This use is likely to continue long term, because it is convenient for patients, enables them to assess progress themselves and allows access to efficacy and adherence data whenever needed, for example, for problem solving, routine follow-up and to complete DVLA reports.

The evidence showed fixed-level CPAP and auto-CPAP to be equally effective, and auto-CPAP to be more costly. Therefore, the committee agreed to recommend fixed-level CPAP as the first-choice treatment. However, some people, particularly those in whom high pressures are only needed part of the time, find auto-CPAP more comfortable and effective than fixed-level CPAP. For others, telemonitoring may not be possible because of technological constraints such as the lack of availability of internet or poor internet connection. The committee agreed that auto-CPAP should be an option in these cases. The committee were also aware that some hospitals get significant discounts on auto-CPAP devices, which might make them more cost effective. Therefore, the committee agreed that if auto-CPAP can be purchased and administered at the same or lower cost than fixed-level CPAP, auto-CPAP could be considered. Given the uncertainty about the cost-effectiveness between auto- and fixed-level CPAP the committee made recommendations for research to help inform future guidelines.

Based on its experience of current practice, the committee agreed that using humidification with CPAP may reduce side effects causing upper airway symptoms and subsequently improve adherence and treatment effectiveness.

Mandibular advancement splints for moderate and severe OSAHS

Although CPAP is the treatment of choice for people with moderate and or severe OSAHS, some people are unable to tolerate it in any form. The evidence showed that mandibular advancement splints are of benefit to people with moderate OSAHS and the committee agreed that they should be considered as an alternative treatment if CPAP is not tolerated

or people decide not to try it. In the absence of evidence for severe OSAHS, the committee agreed that the evidence for moderate OSAHS could be extrapolated to this population. The committee also made a [recommendation for research on mandibular advancement splints for severe OSAHS](#).

The evidence was unclear about the best type of mandibular advancement splint, but from their experience, the committee agreed that devices that are custom made and fitted by a suitably trained dentist are superior to semi-customised and ready-made (also called 'boil and bite') splints. Despite higher initial costs to make and fit, customised devices are more durable and longer lasting than the other devices. They are also preferred by patients. Semi-customised devices also last longer than ready-made devices and are cheaper than customised devices. Both customised and semi-customised devices were shown to be more cost effective than ready-made devices.

Semi-customised devices may be inappropriate for people with active periodontal disease or untreated dental decay, few or no teeth and for people with generalised tonic-clonic seizures. Experienced specialist care is needed to manage these devices in people with few or no teeth. Mandibular advancement splints are not suitable for children and young people under 18 because they may adversely affect development of dentition.

How the recommendations might affect practice

The recommendations for CPAP reflect current practice in most sleep services. Some sleep services currently using auto-CPAP may switch to fixed-level CPAP for new patients starting CPAP, which is likely to be cost saving.

It is expected that there will be increased uptake of customised and semi-customised mandibular advancement splints and therefore a resource increase from this recommendation. NHS provision of dental services producing mandibular advancement splints is currently limited. Mandibular advancement splints need replacing at regular intervals and people using them need follow-up to assess efficacy and dentition.

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Positional modifiers for OSAHS

[Recommendations 1.7.1 and 1.7.2](#)

Why the committee made the recommendations

There was limited evidence on positional modifiers to treat OSAHS and the available studies were small with limited follow-up. The committee agreed that the evidence did not support their use as a first-choice treatment over CPAP and mandibular advancement splints in patients with mild or moderate positional OSAHS. However, there was some evidence of a reduction of OSAHS severity in supine sleep and an associated fall in the number of apnoeas compared with no treatment, with no evidence of adverse effects, so the committee agreed that they could be an option if other treatments were unsuccessful or not tolerated. It is estimated that more than half of people with OSAHS have positional OSAHS, so this recommendation will give more choice and offer an alternative option for the many people who find CPAP and mandibular advancement splints difficult to tolerate or unsuitable.

The committee did not support the use of positional modifiers in people with severe OSAHS, because these people usually continue to have obstructive events even when lying on their side. The committee were also aware of evidence that suggested an increase in the number of apnoeas with the use of positional modifiers in this population.

The studies looked at a variety of different positional modifiers, including the tennis ball technique and an electronic sleep position trainer, but the committee noted that they did not include other devices such as lumbar or abdominal binders, semi-rigid backpacks and full-length pillows. The committee agreed that the evidence for different types of positional modifiers was insufficient to recommend a specific device.

The committee did not make a recommendation for research because it was aware of several relevant research trials already in progress.

How the recommendations might affect practice

Positional modifiers are not used commonly in current practice so the recommendation would involve a change in practice by most providers. Currently people tend to buy their own positional devices, often after not tolerating CPAP or mandibular advancement splints. However, it is only an option if CPAP and mandibular advancement splints are unsuccessful, so increased uptake of these devices and resource impact is likely to be small.

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Surgery for OSAHS

Recommendations 1.7.3 and 1.7.4

Why the committee made the recommendations

The evidence showed that oropharyngeal surgery (including tonsillectomy) was effective in some people with moderate or severe OSAHS.

Based on their knowledge and experience, the committee agreed that tonsillectomy should be prioritised in people with large obstructive tonsils, and that people with a BMI of 35 kg/m² or above are less likely to benefit from surgery because they are more likely to have multi-level upper airway obstruction. There was no direct evidence for people with mild OSAHS, but the committee agreed that tonsillectomy should be applicable to all severities when tonsils are clearly causing obstruction.

Based on the evidence and their knowledge and experience, the committee agreed that other types of oropharyngeal surgery could be an option for some people with severe OSAHS who have been unable to tolerate CPAP and a customised mandibular advancement splint. Although the evidence included people with moderate or severe OSAHS, most were in the severe category and the committee agreed that benefit was more likely in this group. There are no other treatment options for people with severe OSAHS who cannot tolerate CPAP and mandibular advancement splints, and the committee agreed that surgery for the right people would improve their quality of life. They noted that the economic analysis showed that this surgery could be cost effective if the treatment effects are maintained for 2.4 years or more. On that basis, the committee agreed that referral for oropharyngeal surgery is cost effective for carefully selected people with severe OSAHS who have been unable to tolerate other treatments.

The committee stressed that, before considering referral for surgery, people should have fully explored other treatment options under medical supervision for a sufficient period of time. The committee also noted the potential risks of surgical intervention in people with severe OSAHS, and stressed that a personalised approach to patient selection is needed. This includes an assessment of anaesthetic risk and of the type and extent of surgery, which is critical because the outcome will depend on the anatomical and physiological phenotype of OSAHS. They therefore made a recommendation for referral for surgical consideration rather than surgery itself, acknowledging that precise individual assessment by the surgical team would be needed.

Because of a lack of sufficient evidence, the committee did not make any recommendations for nasal or skeletal framework surgery. They made a [recommendation for research on upper airway surgical interventions](#) for people with OSAHS who are unable to tolerate or adhere to CPAP, because there was limited evidence for the applicability of this approach.

How the recommendations might affect practice

The recommendation for tonsillectomy is broadly in line with current practice.

People who are unable to tolerate or adhere to CPAP and mandibular advancement splints are not usually referred for oropharyngeal surgery, so there is likely to be a change in practice for some providers. This recommendation is likely to only affect a small minority of people with severe OSAHS that is not helped by other treatments, have few comorbidities and for whom surgery is a suitable option.

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Oxygen therapy for OSAHS

There was no evidence for oxygen therapy as an adjunct to CPAP for people with OSAHS.

There was also a lack of convincing evidence in favour of oxygen therapy alone for people with moderate OSAHS and no evidence for people with mild and severe OSAHS.

Therefore, the committee decided that because there is a cost associated with this treatment and no evidence of benefit, they could not make a consensus recommendation for oxygen therapy for anyone with OSAHS. They agreed that a [recommendation for research on oxygen therapy](#), specifically looking at the clinical effectiveness of oxygen therapy compared with a placebo in people with OSAHS unable to tolerate CPAP would help to inform future guidance.

Managing rhinitis in people with OSAHS

[Recommendations 1.8.1 to 1.8.4](#)

Why the committee made the recommendations

There was limited evidence to demonstrate the benefits of treating rhinitis. However, the committee agreed, based on their knowledge and experience, that treating rhinitis and other causes of nasal obstruction is important and may help people use CPAP more comfortably, and has a positive impact on sleep disorders. Changing the interface from a nasal to an orofacial mask and adding humidification can also help. The committee advised that current practice should be followed for initial treatment, and that referral to an ear, nose and throat specialist may be needed for further assessment of persistent symptoms.

How the recommendations might affect practice

The recommendations reflect current practice in most NHS centres, so there is likely to be little change in practice.

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Follow-up for people with OSAHS

[Recommendations 1.9.1 to 1.9.8](#)

Why the committee made the recommendations

There was limited evidence on follow-up, so the committee also used their clinical knowledge and experience to make the recommendations.

The committee noted that CPAP is just one aspect of treatment for OSAHS, and that follow-up should be tailored to the person's overall treatment plan. This may include lifestyle changes (such as weight management, modifying use of sedative drugs and alcohol, and stopping smoking) and treating underlying lung disease and other comorbidities.

Follow-up for people using CPAP

CPAP adherence patterns are usually established in the first week of therapy. Therefore the committee agreed that early assessment of CPAP (within 1 month) is helpful to check adherence, for initial problem solving and to provide support. There was no evidence to suggest a difference between face-to-face, phone and video consultations, so the

committee agreed that these could all be options for follow-up. The evidence also suggested that consultations with telemonitoring were as effective as those without telemonitoring. However, there was some evidence available for people with severe OSAHS that suggested adherence is improved by including telemonitoring and the committee agreed that the data could be extrapolated to people with mild and moderate OSAHS.

The committee agreed that although the available evidence did not show much benefit, in their experience telemonitoring offers significant advantages over not using telemonitoring to both the clinician and the person using CPAP. These include early night-by-night access to data, which can lead to early detection of problems such as mask leaks or persistent respiratory events of sleep apnoea, and the ability to monitor control of OSAHS and adherence to therapy.

Telemonitoring makes managing a person's OSAHS more efficient for healthcare professionals because they have ready access to the person's data when needed, for example, to help identify a problem (such as, mask leak or inadequate pressure) and take action without a scheduled appointment.

The committee agreed that video and phone consultations along with telemonitoring are also advantageous in reducing the number of in-person visits needed to the sleep service. This can be particularly beneficial to people who have difficulty getting to clinics, for example, those who live in remote areas or have poor mobility. The reduction in the number of face-to-face consultations will also help reduce the risk of infection during the COVID-19 pandemic. Based on their experience, the committee agreed that subsequent follow-up should be personalised until effective CPAP treatment is established.

The committee discussed the benefits of longer-term follow-up comparing annual with a 2-yearly follow-up interval once CPAP is established. They agreed that annual follow-up should be considered because it allows the opportunity to review progress and symptom control, assess adherence and effectiveness, and review the need to continue therapy. The committee also agreed that support between appointments was important in case of problems, and for providing advice, equipment and consumables.

Follow-up for people using mandibular advancement splints

No evidence was identified on monitoring for people using mandibular advancement splints. Based on experience, the committee agreed that early face-to-face follow-up, or

video or phone consultation is advisable for people using a mandibular advancement splint to review symptom improvement and make further adjustments to the device. Subsequent follow-up should be personalised and include assessment of side effects and the impact on dentition and bite.

Follow-up for people using positional devices

There was no evidence on monitoring for people using positional devices, but the committee also agreed that early face-to-face follow-up, video or phone consultation is beneficial to assess symptom control and determine whether respiratory events are controlled.

Follow-up for people who have had surgery

For people who have had surgery for OSAHS, the committee agreed that follow-up should happen within 3 months and include respiratory polygraphy. Wound healing and any early inflammation should be resolved before this is considered.

Follow-up for drivers

The committee noted that an annual review is required by the DVLA for Group 2 licence holders (lorry and bus drivers) with moderate or severe OSAHS and excessive sleepiness at diagnosis. For Group 1 licence holders (car and motorcycle drivers) with OSAHS and excessive sleepiness, review is required at least every 3 years. For more information, see the [DVLA guidance on assessing fitness to drive](#).

How the recommendations might affect practice

Current practice includes a mixture of face-to-face, phone and video consultations and telemonitoring. The increasing number of people being offered CPAP means that providing regular outpatient follow-up has become increasingly difficult. The use of telemonitoring may increase, which is likely to reduce the need for face-to-face consultations and may reduce pressure on outpatient clinics. Increasing web- and app-based access to telemonitoring data will allow patients to access their own results and will encourage self-management.

The committee noted that there has been a significant move to video and phone consultations to reduce the risk of infection during the COVID-19 pandemic, and this shift

in practice is likely to persist.

The committee stressed that telemonitoring crucially involves feedback to patients, and time should be available for sleep service staff to review data, act on this and share with the person using CPAP. Current practice already includes ready access to advice and CPAP equipment from sleep services.

Recommendations on monitoring for positional modifiers, mandibular advancement splints and surgery are considered to be current practice in many areas and are not expected to lead to major changes in practice.

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Monitoring treatment efficacy in people with OSAHS

[Recommendations 1.9.9 to 1.9.11](#)

Why the committee made the recommendations

No evidence was available on the efficacy of treatment for OSAHS, so the recommendations are based on the committee's knowledge and experience.

The effectiveness of treatment can be confirmed by control of symptoms and AHI or oxygen desaturation index (ODI), and uptake and adherence to therapy. The committee identified several factors that commonly cause problems with CPAP that should be routinely reviewed if treatment is not working. As well as assessing sleepiness, the committee agreed that vigilance should be assessed by discussing the person's alertness and ability to concentrate on tasks. This is particularly important for drivers.

OSAHS may sometimes resolve, for example, because of weight loss or other lifestyle changes. The committee agreed that stopping treatment should be considered if this is suspected. If symptoms return, these will need to be re-evaluated. A sleep study may be needed to confirm whether OSAHS has resolved.

How the recommendations might affect practice

These recommendations reflect current practice and are not expected to lead to a change in practice.

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Supporting adherence to treatment for OSAHS

[Recommendations 1.10.1 and 1.10.2](#)

Why the committee made the recommendations

The committee considered behavioural, supportive and educational interventions and made recommendations based on the evidence and their experience.

The evidence suggested that all types of interventions to support adherence (educational, behavioural, supportive and mixed) increased CPAP use in people starting CPAP for the first time with moderate or severe OSAHS. There was no evidence available for people with mild OSAHS, but the committee agreed that these recommendations would be applicable to all people having treatment for OSAHS. The committee agreed that educational or supportive interventions, or a combination of these, provided by specialist staff, would help to improve adherence to CPAP.

Educational interventions include providing information about OSAHS, its treatment and outcomes, which can be delivered using a variety of different sessions and formats. Supportive interventions involve additional clinical follow-up (for example, extra clinic visits, video or teleconsultations or use of telemonitoring) to provide support. The nature of behavioural interventions varied widely, making it difficult to identify the most effective components. Therefore, the committee could not recommend any specific behavioural interventions.

Optimal adherence to CPAP therapy is conventionally considered to be 4 hours or more per night or using CPAP for an average of more than 4 hours per night for 70% or more nights. Early adherence studies focused on control of sleepiness but there is evidence that increased CPAP use of more than 5 hours a night in OSAHS benefits other aspects of health such as control of blood pressure and cardiovascular risk. However, it is recognised that people can gain some benefit from a shorter period of use, and individual response is

variable. People should be encouraged to maximise their CPAP use to achieve optimal control of their symptoms, underlying conditions, sleep quality and quality of life.

There was no evidence available for improving adherence to mandibular advancement splint and positional modifiers in OSAHS. However, the committee agreed that evidence for improving adherence for CPAP could be applied to other treatments.

Because there was no evidence for people who have difficulty using CPAP, the committee made a [recommendation for research on interventions to improve CPAP adherence](#) to inform future guidance.

How the recommendations might affect practice

The recommendations reflect best practice, but current provision varies across NHS settings. Therefore, the recommendations will involve a change of practice for some providers.

[Return to recommendations](#)

When to suspect OHS

[Recommendation 2.1.1](#)

Why the committee made the recommendation

No evidence was available on identifying who to assess for obesity hypoventilation syndrome (OHS), so the recommendation is based on the committee's knowledge and experience.

The committee agreed that further assessment for OHS should be carried out in people with obesity together with symptoms of OSAHS or features of nocturnal hypoventilation. These criteria were chosen because some people with OHS have OSAHS, some have nocturnal hypoventilation alone, and others have both. A low arterial oxygen saturation value or polycythaemia may be indicative of OHS, but raised PaCO₂ (partial pressure of carbon dioxide) is needed for diagnosis (for more information, see the [rationale and impact section on diagnostic tests for OHS](#)).

How the recommendation might affect practice

In current practice, not all people with the listed symptoms and features are considered for further assessment for OHS, so this recommendation may result in a change of practice for most providers, leading to more testing and treatment. This will be magnified by the rising prevalence of obesity in the general population.

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Assessment scales for suspected OHS

[Recommendations 2.1.2 and 2.1.3](#)

Why the committee made the recommendations

No evidence was found on assessment tools for suspected OHS, so the committee based the recommendation on their knowledge and experience. They agreed that the Epworth Sleepiness Scale has a useful role in monitoring and assessment of sleepiness in people with OHS. However, they noted that not all people with OHS have excessive sleepiness and that healthcare professionals may not always be aware of this.

The evidence for the STOP-Bang Questionnaire was limited to OSAHS only and there was no validation for its use in OHS. The committee agreed that the STOP-Bang Questionnaire is not used in practice for OHS, so they did not make a recommendation for this.

How the recommendations might affect practice

The Epworth Sleepiness Scale is widely used in current practice, so the recommendations are not expected to involve a change in practice.

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Prioritising people for rapid assessment by a sleep service

[Recommendations 2.2.1 and 2.2.2](#)

Why the committee made the recommendations

No evidence was available for prioritising people with OHS for assessment in a sleep service, so the committee used their knowledge and experience to identify groups that would benefit most from prompt assessment and treatment.

The committee noted that people with a BMI over 30 kg/m² and severe hypercapnia or hypoxaemia should be prioritised because they have chronic ventilatory failure and are at risk of acute decompensated ventilatory failure, both of which carry a poor prognosis.

The committee agreed that sleep services should prioritise access to a sleep study and treatment for people in whom vigilance and alertness are vital to occupational safety, particularly those with problematic sleepiness, and to people with pre-existing conditions who are at increased risk of adverse events. They agreed that services should aim to fast-track priority groups to be seen as soon as possible.

The committee discussed the effect on work performance and safety for people with suspected OHS who also have OSAHS and how it could increase the risk of work accidents in safety-sensitive occupations. People with a wide range of jobs or activities could be affected, for example, drivers, train drivers, pilots, heavy machinery operators, surgeons and people caring for vulnerable children or adults. They noted that [DVLA guidance on assessing fitness to drive](#) recommends that drivers with suspected or confirmed OSAHS and excessive sleepiness having, or likely to have, an adverse impact on driving must not drive until there is satisfactory symptom control. Control of symptoms is likely to need assessment and treatment from a sleep specialist.

The committee agreed that priority should be given to pregnant women, because uncontrolled OHS may adversely affect both the mother and baby.

The committee agreed that people with unstable cardiovascular disease should be offered early investigation and treatment, because cardiovascular complications are a major cause of mortality and morbidity in people with OHS.

The committee agreed that people with a high probability of OHS who need major surgery should be prioritised to avoid delaying surgery.

The committee also agreed that the risk of sudden blindness in patients with non-arteritic anterior ischaemic optic neuropathy warrants priority assessment because of its possible

association with OHS.

To ensure that people are prioritised appropriately by sleep services, and to allow fast-tracking directly to a sleep study, the committee agreed on key details, based on their experience, that should be included in referral letters.

How the recommendations might affect practice

In current practice, specific groups are not always prioritised for assessment, so there is likely to be a change in practice for some providers. There is increasing pressure on sleep services, and offering higher priority to some groups may delay studies for other people. Planning for and providing rapid-access sleep studies may help to reduce the pressure on services, with triage of referrals allowing people to be fast-tracked directly to a diagnostic study.

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Diagnostic tests for OHS

[Recommendations 2.3.1 to 2.3.6](#)

Why the committee made the recommendations

The committee noted that OHS is defined by the presence of PaCO_2 greater than 6.0 kPa while awake in people with a BMI of 30 kg/m^2 or more. There was no evidence for diagnostic tests to identify the presence of OSAHS or nocturnal hypoventilation in people with suspected OHS, so the committee also used their clinical knowledge and experience to make the recommendations.

Diagnosing OHS and assessing ventilatory failure

OHS is a specific form of chronic ventilatory failure and, by definition, a measurement of PaCO_2 from arterial or arterialised capillary blood gas, taken while the person with suspected OHS is awake, is needed to establish the diagnosis and to assess the extent of chronic ventilatory failure. It is current practice to measure these and, although they are invasive tests, obtaining the samples is generally straightforward.

Serum venous bicarbonate indirectly reflects medium- and long-term PaCO₂ levels. It is a simpler test to perform, and a normal level is helpful in ruling out OHS if the pre-test probability of the diagnosis is low. The committee therefore agreed that it could be recommended in such cases, but noted that this alone will not completely rule out OHS and that other tests are needed when clinical suspicion is high.

People with any form of chronic ventilatory failure can readily develop acute ventilatory failure if, for example, they have an intercurrent respiratory tract infection. Acute ventilatory failure is a medical emergency needing urgent treatment, and the committee agreed it is important to state that this should take priority over full investigation of any underlying chronic disease.

Diagnosing the presence of OSAHS or nocturnal hypoventilation in OHS

Diagnosis of coexisting OSAHS is needed to ensure optimal choice of treatment, and the committee agreed that this should be with either hospital or home respiratory polygraphy, based on their experience and the evidence for diagnosis of OSAHS in people without OHS (see the rationale section on diagnostic tests for OSAHS). The committee agreed that transcutaneous CO₂ monitoring with respiratory polygraphy should also be considered at the same time, to help establish the severity of nocturnal hypoventilation. A markedly raised CO₂ level suggests non-invasive ventilation may be the treatment of choice rather than CPAP.

Home or hospital respiratory polygraphy are recommended equally because diagnosing the presence of OSAHS in OHS is more complex than diagnosing OSAHS alone; it is important to be able to distinguish between OSAHS and nocturnal hypoventilation. The committee also discussed that CO₂ monitoring is quite hard to do at home.

Oximetry alone is insufficient for diagnosis because it does not clearly distinguish between obstructive apnoeas and nocturnal hypoventilation.

How the recommendations might affect practice

The recommendations reflect current practice and would therefore not be expected to increase NHS cost.

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Lifestyle advice for OHS

Recommendation 2.4.1

Why the committee made the recommendation

Evidence for lifestyle advice was not reviewed because it is covered by other NICE guidelines.

The committee agreed that all people with OHS should discuss lifestyle changes with their healthcare professional. This should focus on weight loss and be tailored to the person's needs and the chosen treatment method.

Lifestyle changes are important because obesity increases the prevalence and severity of OHS, smoking causes upper airway inflammation (which can exacerbate symptoms), and excess alcohol before sleep reduces upper airway tone (increasing apnoeas) and reduces sleep quality. Advice on sleep hygiene may include ensuring adequate sleep time, avoiding caffeine and stimulants that interfere with sleep before bedtime, exercising regularly, having a quiet, comfortable, darkened bedroom, and winding down before sleep.

How the recommendation might affect practice

Lifestyle advice is widely used in current practice, so the recommendations are not expected to involve a change in practice.

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Treatments for OHS

Recommendations 2.5.1 to 2.5.8

Why the committee made the recommendations

CPAP and non-invasive ventilation

The evidence was limited to people with OHS and severe OSAHS without acute ventilatory failure. It showed that both CPAP and non-invasive ventilation are beneficial compared

with lifestyle changes, and that there is little difference in effectiveness between these treatments. There was no evidence for people with acute ventilatory failure.

Based on evidence and their experience, the committee agreed that CPAP should be offered as a first-line treatment for people with OHS and severe OSAHS who do not have acute ventilatory failure because it is more cost effective, simpler to set up and may be better tolerated than non-invasive ventilation. If symptoms do not improve, severe hypercapnia persists, AHI or ODI are not sufficiently reduced, or CPAP is poorly tolerated, the committee agreed that treatment should be changed to non-invasive ventilation to control nocturnal hypoventilation.

In line with current practice, the committee agreed that non-invasive ventilation should be considered as first-line treatment for people with OHS in the absence of severe OSAHS.

Although there was no direct evidence available, the committee were clear that non-invasive ventilation should be the first-line treatment for people with OHS and acute ventilatory failure because rapid improvement in hypercapnia is a priority. A trial without non-invasive ventilation may be suitable for people in whom hypercapnia resolves. In this instance, they should remain under review in case hypercapnia recurs and be restarted on non-invasive ventilation, if necessary. Assessment with respiratory polygraphy on recovery should be carried out to determine if long-term treatment with CPAP or non-invasive ventilation is needed. The committee agreed that people with residual OSAHS but minimal hypoventilation when stable can be switched to CPAP.

Oxygen therapy

No evidence was available for oxygen therapy in people with OHS. The committee agreed that, although optimal CPAP or non-invasive ventilation will usually be sufficient to correct ventilatory failure, some people with OHS may remain hypoxaemic during sleep despite control of AHI and nocturnal hypercapnia on CPAP or non-invasive ventilation. This would be shown on oximetry measures or on arterial blood gas during sleep. Addition of supplemental oxygen therapy to the CPAP or non-invasive ventilation during sleep may be needed to correct this hypoxia and any additional underlying causes of hypoxaemia should be addressed where possible. Usually only a low flow rate such as 1 to 2 litres/minute would be needed. Repeating oximetry or arterial blood gas would allow the response to this oxygen therapy to be evaluated and any further adjustments to oxygen prescription to be made.

How the recommendations might affect practice

The use of CPAP for people with OHS is a change in practice that is likely to result in less non-invasive ventilation use.

The recommendations on oxygen therapy reflect current practice in most NHS centres, so there is likely to be little impact on practice.

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Managing rhinitis in people with OHS

[Recommendations 2.6.1 to 2.6.4](#)

Why the committee made the recommendations

No evidence was available on managing rhinitis for people with OHS. The committee agreed that recommendations for OSAHS are applicable to people with OHS as well. They agreed, based on their knowledge and experience, that treating rhinitis and other causes of nasal obstruction is important and may help people use CPAP more comfortably, and have a positive impact on sleep disorders. Changing the interface from a nasal to an orofacial mask and adding humidification can also help. The committee advised that current practice should be followed for initial treatment, and that referral to an ear, nose and throat specialist may be needed for further assessment of persistent symptoms.

How the recommendations might affect practice

The recommendations reflect current practice in most NHS centres, so there is likely to be little change in practice.

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Follow-up for people with OHS

[Recommendations 2.7.1 to 2.7.5](#)

Why the committee made the recommendations

The committee noted that CPAP and non-invasive ventilation are just part of treatment for OHS, and that follow-up should be tailored to the person's overall treatment plan. This should also include lifestyle changes (such as weight management, modifying use of sedative drugs and alcohol, and stopping smoking) and treating underlying lung disease and other comorbidities.

Based on their knowledge and experience, the committee agreed that for people with OHS starting CPAP or non-invasive ventilation, early follow-up at 1 month is advisable to review control of symptoms, sleep-disordered breathing and adherence. Problem solving can be achieved by face-to-face, video or phone consultations, and can include review of telemonitoring data if available. The committee also agreed that although most studies of telemonitoring are in patients with OSAHS, and that there is not yet the ability to assess hypercapnia through telemonitoring, it is still of value for monitoring in people with OHS who also have OSAHS.

In addition to annual review, people with OSAHS and OHS having CPAP or non-invasive ventilation therapy need to be able to access a sleep service for advice and provision of consumables such as masks, circuitry and filters.

Follow-up for drivers

The committee noted that an annual review is required by the DVLA for Group 2 licence holders (lorry and bus drivers) with moderate or severe OSAHS and excessive sleepiness at diagnosis. For Group 1 licence holders (car and motorcycle drivers) with OSAHS and excessive sleepiness, review is required at least every 3 years. For more information, see the [DVLA guidance on assessing fitness to drive](#).

How the recommendations might affect practice

Current practice includes a mixture of face-to-face, phone and video consultations and telemonitoring. The increasing number of people being offered CPAP means that providing regular outpatient follow-up has become increasingly difficult. In addition, a more personalised approach enables attention to be focused on people with problems adapting to therapy. Telemonitoring is included in the overall cost of CPAP devices by some manufacturers for variable periods, and is increasingly available for non-invasive ventilators. The committee discussed that routine use of telemonitoring should reduce the

need for face-to-face consultations, and reduce pressure on outpatient clinics, but feedback and discussion with patients is still needed. Increasing web- and app-based access to telemonitoring data will allow patients to access their own results and encourage self-management.

The committee noted that there has been a significant move to video and phone consultations to reduce the risk of infection during the COVID-19 pandemic, and this shift in practice is likely to persist.

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Monitoring treatment efficacy for people with OHS

[Recommendations 2.7.6 to 2.7.8](#)

Why the committee made the recommendations

No evidence was available for demonstrating efficacy of treatment for OHS, so the recommendations are based on the committee's knowledge and experience.

In OHS, control of nocturnal hypoventilation is demonstrated by improvement of symptoms, hypercapnia when awake and asleep, and oxygenation. It is important to optimise these to improve wellbeing and prognosis, and to reduce the risk of hospital admission.

The committee agreed that clinical effectiveness of CPAP and non-invasive ventilation in people with OHS should be assessed by reviewing symptoms of OSAHS and nocturnal hypoventilation including Epworth Sleepiness Scale score, AHI or ODI, adherence to therapy, improvement in oxygenation and hypercapnia while awake and asleep, and telemonitoring or download information from the CPAP or non-invasive ventilation device. As well as assessing sleepiness, the committee agreed that vigilance should be assessed by discussing the person's alertness and ability to concentrate on tasks. This is particularly important for drivers.

The committee agreed that the understanding and experience of people having CPAP or non-invasive ventilation should be explored, and factors that commonly cause problems should be reviewed.

The committee highlighted that in people with OHS, the need for oxygen therapy and adherence to this should be reviewed after treatment with non-invasive ventilation or CPAP has been optimised.

How the recommendations might affect practice

These recommendations reflect current practice and are not expected to lead to major changes in practice.

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Supporting adherence to treatment for OHS

[Recommendations 2.8.1 and 2.8.2](#)

Why the committee made the recommendations

There was no evidence available for people with OHS. The committee agreed that the evidence reviewed for supporting adherence to CPAP in people with OSAHS could be extrapolated to treatments in people with OHS.

How the recommendations might affect practice

The recommendations reflect best practice but are currently implemented to varying degrees across NHS settings and will involve a change of practice for some providers.

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When to suspect COPD–OSAHS overlap syndrome

[Recommendation 3.1.1](#)

Why the committee made the recommendation

No evidence was available for when to suspect chronic obstructive pulmonary disease–obstructive sleep apnoea/hypopnoea syndrome (COPD–OSAHS) overlap syndrome, so the recommendations are based on the committee's knowledge and

experience.

COPD–OSAHS overlap syndrome describes the combination of COPD and OSAHS. These are 2 of the most prevalent pulmonary conditions and therefore the combination is likely to be common. Hypoxaemia due to COPD is exacerbated during sleep by OSAHS, which may worsen prognosis and symptom burden. The committee agreed that a sleep history should be taken and further assessment for OSAHS carried out in people with COPD presenting with common symptoms and features of either OSAHS or nocturnal hypoventilation. The type of symptoms, nature of sleep-disordered breathing and outcome will be affected by the relative severity of COPD and OSAHS.

How the recommendation might affect practice

It is estimated that COPD–OSAHS overlap syndrome has a prevalence of approximately 1% and is currently under recognised. In current practice, not all people with the symptoms and features of OSAHS listed in the recommendation are considered for further assessment for COPD–OSAHS overlap syndrome, hence implementation of these recommendations may change practice for most providers. A growth in referrals for sleep study is anticipated with an increased understanding of the impact of COPD–OSAHS overlap syndrome. As a result of increased diagnosis, CPAP and non-invasive ventilation use may increase. Treatment in turn may reduce acute admissions and long-term complications.

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Assessment scales and tests for suspected COPD–OSAHS overlap syndrome

[Recommendations 3.1.2 to 3.1.5](#)

Why the committee made the recommendations

There was limited evidence on assessment tools for suspected COPD–OSAHS overlap syndrome, so the committee also used their knowledge and collective experience to make the recommendations.

The Epworth Sleepiness Scale is intended to assess for sleepiness and the limited

evidence reflected this, showing that it had moderate sensitivity and low specificity for diagnosing COPD–OSAHS overlap syndrome. The committee noted that some people with this syndrome do not have excessive sleepiness and that not all healthcare professionals are aware of this. However, they agreed that it has a useful role in assessment and monitoring, and noted that when healthcare professionals are requested by the DVLA to complete assessment of a driver with OSAHS (which will include those with COPD–OSAHS overlap syndrome), this includes the Epworth Sleepiness Scale.

Limited evidence showed that the STOP-Bang Questionnaire had high sensitivity and low specificity for diagnosing COPD–OSAHS overlap syndrome. Sensitivity is a priority for questionnaires used for initial assessment. The committee had some concerns about its accuracy in people with less common presentations and in women, but agreed that it could have a role in assessment, alongside the Epworth Sleepiness Scale, to inform the preliminary understanding of the person's symptoms and concerns. The Epworth questionnaire is used to assess only sleepiness whereas the STOP-Bang Questionnaire is used to assess risk of having OSAHS and includes parameters such as snoring, tiredness, history of high blood pressure, BMI, age, neck size and gender. With this in mind, the committee agreed that the Epworth questionnaire should be used, and the STOP-Bang Questionnaire could also be considered for initial assessment.

Spirometry is routinely measured in clinical practice to assess the severity of COPD, and it aids the understanding of the relative contribution of COPD and OSAHS to symptom load and pathophysiology.

How the recommendations might affect practice

The Epworth Sleepiness Scale and the STOP-Bang Questionnaire are widely used in current practice, and spirometry is routinely used to assess COPD, so the recommendations are not expected to involve a change in practice.

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Prioritising people for rapid assessment by a sleep service

[Recommendations 3.2.1 and 3.2.2](#)

Why the committee made the recommendations

No evidence was available for prioritising people with COPD–OSAHS overlap syndrome for assessment in a sleep service, so the committee used their knowledge and experience to identify groups that would benefit most from prompt assessment and treatment.

The committee noted that people with suspected COPD–OSAHS overlap syndrome who have severe hypercapnia or hypoxaemia should be prioritised for assessment because they have chronic ventilatory failure, and are at risk of acute decompensated ventilatory failure, both of which carry a poor prognosis.

The committee agreed that sleep services should prioritise access to a sleep study and treatment for people in whom vigilance and alertness are vital to occupational safety, particularly those with problematic sleepiness, and to people with pre-existing conditions who are at increased risk of adverse events. They agreed that services should aim to fast-track priority groups to be seen as soon as possible.

The committee discussed the effect of OSAHS on work performance and safety, and how it could increase the risk of work accidents in safety-sensitive occupations. People with a wide range of jobs or activities could be affected, for example, drivers, train drivers, pilots, heavy machinery operators, surgeons and people caring for vulnerable children or adults. The committee noted that [DVLA guidance on assessing fitness to drive](#) recommends that drivers with suspected or confirmed OSAHS and excessive sleepiness having, or likely to have, an adverse impact on driving must not drive until there is satisfactory symptom control. Control of symptoms is likely to need assessment and treatment from a sleep specialist.

The committee agreed that priority should be given to pregnant women, because COPD–OSAHS overlap syndrome may be associated with poor outcomes for mothers and babies.

People with suspected COPD–OSAHS overlap syndrome and unstable cardiovascular disease need early investigation and treatment, because cardiovascular complications may be a major cause of mortality and morbidity in overlap syndrome.

The committee agreed that people with a high probability of COPD–OSAHS overlap syndrome who need major surgery should be prioritised to avoid delaying surgery.

The committee also agreed that the risk of sudden blindness in patients with non-arteritic anterior ischaemic optic neuropathy warrants priority assessment because of its possible association with COPD–OSAHS overlap syndrome.

To ensure that patients are prioritised appropriately by sleep services and to allow fast-tracking directly to a sleep study, the committee agreed on key details, based on their experience, that should be included in referral letters.

How the recommendations might affect practice

In current practice, specific groups are not always prioritised for assessment, so there is likely to be a change in practice for some providers. There is increasing pressure on sleep services, and offering higher priority to some groups may delay studies for other people. Planning for and providing rapid-access sleep studies may help to reduce the pressure on services, with triage of referrals allowing people to be fast-tracked directly to a diagnostic study.

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Diagnostic tests for COPD–OSAHS overlap syndrome

[Recommendations 3.3.1 to 3.3.5](#)

Why the committee made the recommendations

There was little evidence for diagnostic tests in people with COPD–OSAHS overlap syndrome, so the committee used their clinical knowledge and experience, and the evidence on testing for OSAHS, to make the recommendations.

Diagnosing ventilatory failure

The committee agreed that arterial or arterialised capillary blood gas measurement is needed to assess for ventilatory failure. People with any form of chronic ventilatory failure can readily develop acute ventilatory failure if, for example, they have an intercurrent respiratory tract infection. Acute ventilatory failure is a medical emergency needing urgent treatment, and the committee agreed it important to state that this should take priority

over full investigation of any underlying chronic disease.

The committee agreed that arterial blood gas and arterialised capillary blood gas measurements give precise information about oxygen and carbon dioxide levels and information about acid–base balance at the point in time they are taken. It is current practice to use them, and they are generally straightforward to measure.

Diagnosing OSAHS or nocturnal hypoventilation in COPD–OSAHS overlap syndrome

Respiratory polygraphy (either in hospital or at home) is recommended to establish the presence and severity of OSAHS and nocturnal hypoventilation, and to help determine the most suitable treatment (such as non-invasive ventilation or CPAP). The committee agreed that transcutaneous CO₂ monitoring with respiratory polygraphy should also be considered to help confirm nocturnal hypoventilation and severity of hypercapnia. Adding transcutaneous CO₂ monitoring with respiratory polygraphy may also help to define the relative contributions of COPD and OSAHS and therefore guide treatment choices and titration of settings. The person needs to have stable COPD, without recent exacerbations, before a clear diagnosis can be established.

Home or hospital respiratory polygraphy are recommended equally because diagnosing the presence of OSAHS in COPD–OSAHS overlap syndrome is more complex than diagnosing OSAHS alone. The hospital setting may be better for distinguishing between OSAHS and nocturnal hypoventilation, and determining whether to offer CPAP or non-invasive ventilation to a person with COPD on long-term oxygen therapy. The committee also discussed that CO₂ monitoring is quite hard to do at home.

Oximetry alone should not be used to diagnose OSAHS in this population because people with COPD are more likely to have a degree of hypoxaemia when awake, and therefore more easily exhibit falls in oxygen saturation level during sleep, making identification of apnoea episodes more difficult.

How the recommendations might affect practice

The recommendations reflect current practice.

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Treatments for COPD–OSAHS overlap syndrome

Recommendations 3.5.1 to 3.5.5

Why the committee made the recommendations

CPAP and non-invasive ventilation

No evidence was identified for CPAP or non-invasive ventilation for people with COPD–OSAHS overlap syndrome, so the recommendations are based on the committee's knowledge and experience.

The committee agreed that treatment for this population depends on the level of hypercapnia when awake and asleep. People with more severe hypercapnia when awake (PaCO_2 greater than 7 kPa) caused by nocturnal hypoventilation, are likely to need non-invasive ventilation. This is based on extrapolation from data, not reviewed for this guideline but known to the committee, on people with COPD without OSAHS. In these people, definite benefit of non-invasive ventilation has not been demonstrated when hypercapnia is modest (PaCO_2 between 6 kPa and 7 kPa, and not associated with exacerbation of COPD). The committee therefore recommended that CPAP should be considered in people with COPD–OSAHS overlap syndrome if they have confirmed OSAHS from a sleep study and if their PaCO_2 is less than or equal to 7.0 kPa, and non-invasive ventilation should be considered if the PaCO_2 is higher.

The committee also made a recommendation for research on the optimal treatment for people with COPD–OSAHS overlap syndrome to inform future guidance.

Based on their experience of current practice, the committee agreed that using humidification with CPAP for people with COPD–OSAHS overlap syndrome who have nasal symptoms may reduce side effects associated with upper airway dryness and this may improve adherence and treatment effectiveness.

For all treatments, the committee highlighted the importance of assessing response to treatment (see recommendations 3.7.6 to 3.7.10).

Oxygen therapy

No evidence was available for oxygen therapy in people with COPD–OSAHS overlap

syndrome. Some people will be established users of long-term oxygen therapy, in which case their supplemental oxygen can be given by CPAP or non-invasive ventilation while sleeping, with oxygen flow rate and non-invasive ventilation or CPAP settings titrated during respiratory polygraphy, according to individual need.

People with COPD–OSAHS overlap syndrome are subject to greater falls in oxygen saturation while sleeping than those with COPD alone, and the committee therefore agreed that people with COPD–OSAHS overlap syndrome who do not fulfil the criteria for long-term oxygen therapy may need supplemental oxygen therapy during sleep if they remain hypoxaemic despite control of AHI and nocturnal hypercapnia on CPAP or non-invasive ventilation, and any additional underlying causes of hypoxaemia should be addressed where possible.

Why the committee did not make recommendations

Mandibular advancement splints for people with COPD–OSAHS overlap syndrome

There was no evidence for the use of mandibular advancement splints in people with COPD–OSAHS overlap syndrome. The committee discussed whether evidence from people with OSAHS could be used for people with COPD–OSAHS overlap syndrome, but they agreed that the differences between these 2 groups are too great to allow them to make a consensus recommendation based on this evidence.

The committee were also aware of the potential risks of the long-term use of mandibular advancement splints. People with COPD–OSAHS overlap syndrome are generally older and have poorer dentition which makes mandibular advancement splints less likely to be effective. They also agreed that people with COPD–OSAHS overlap syndrome are at risk of or have ventilatory failure, and mandibular advancements splints are not appropriate in those circumstances.

How the recommendations might affect practice

The recommendations reflect current practice.

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Follow-up for people with COPD–OSAHS overlap syndrome

Recommendations 3.7.1 to 3.7.5

Why the committee made the recommendations

The committee noted that CPAP and non-invasive ventilation are just part of treatment for COPD–OSAHS overlap syndrome, and that follow-up should be tailored to the person's overall treatment plan. This should also include lifestyle changes (such as weight management, modifying use of sedative drugs and alcohol, and stopping smoking) and treating underlying lung disease and other comorbidities. For some people, it may also include discussions about care planning (for example, COPD exacerbation action plan and advance care planning) for those with severe COPD.

Based on their knowledge and experience, the committee agreed that for people with COPD–OSAHS overlap syndrome starting CPAP or non-invasive ventilation, early follow-up is advisable to review control of symptoms, sleep-disordered breathing and adherence. Problem solving can be achieved by face-to-face consultations, or video or phone consultations, and include review of telemonitoring data if available. The committee also agreed that although most studies of telemonitoring are in people with OSAHS, and that there is not yet the ability to assess hypercapnia through telemonitoring, it is still of value for monitoring in people with COPD–OSAHS overlap syndrome.

In addition to their 6-monthly or annual review, people with COPD–OSAHS overlap syndrome having CPAP or non-invasive ventilation need to be able to access a sleep service for advice, and provision of consumables such as masks, circuitry and filters.

Follow-up for drivers

The committee noted that annual review is required by the DVLA for Group 2 licence holders (lorry and bus drivers) with moderate or severe OSAHS and excessive sleepiness at diagnosis. For Group 1 licence holders (car and motorcycle drivers) with OSAHS and excessive sleepiness, review is required at least every 3 years. For more information, see the [DVLA guidance on assessing fitness to drive](#).

How the recommendations might affect practice

Current practice includes a mixture of face-to-face, phone, video consultations and telemonitoring. The increasing number of people being offered CPAP and non-invasive ventilation means that regular outpatient follow-up becomes difficult for sleep services to provide. In addition, a more personalised approach enables attention to be focused on people with problems adapting to therapy. Telemonitoring is included in the overall cost of CPAP devices by some manufacturers for variable periods. The committee discussed that routine use of telemonitoring should reduce the need for face-to-face consultations, and reduce pressure on outpatient clinics, but feedback and discussion with patients is still needed. Increasing web- and app-based access to telemonitoring data will allow patients to access their own results and encourage self-management.

The committee noted that there has been a significant move to video and phone consultations to reduce the risk of infection during the COVID-19 pandemic, and this shift in practice is likely to persist.

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Monitoring treatment efficacy for people with COPD–OSAHS overlap syndrome

[Recommendations 3.7.6 to 3.7.10](#)

Why the committee made the recommendations

No evidence was available on efficacy of treatment for COPD–OSAHS overlap syndrome, so the recommendations are based on the committee's knowledge and experience.

In COPD–OSAHS overlap syndrome, control of nocturnal hypoventilation is demonstrated by normalisation of oxygenation and hypercapnia when awake and asleep; this is important to improve prognosis.

The committee agreed that clinical effectiveness of CPAP and non-invasive ventilation in people with COPD–OSAHS overlap syndrome should be assessed by reviewing symptoms of OSAHS and nocturnal hypoventilation including Epworth Sleepiness Scale score, AHI or ODI, adherence to therapy, improvement in oxygenation and hypercapnia (if present) while

awake and asleep, and telemonitoring or download information from CPAP or non-invasive ventilation device. As well as assessing sleepiness, the committee agreed that vigilance should be assessed by discussing the person's alertness and ability to concentrate on tasks. This is particularly important for drivers. The committee agreed that the understanding and experience of people having CPAP and non-invasive ventilation should be explored, and factors that commonly cause problems should be reviewed. They noted that sleep quality may be poor in COPD patients, with disruption from cough, wheeze, restless legs and medication.

The committee highlighted that in people with COPD–OSAHS overlap syndrome who are already having supplemental oxygen therapy, the need for oxygen therapy should be reviewed after treatment with non-invasive ventilation or CPAP has been optimised. Effective treatment with CPAP or non-invasive ventilation may improve the person's condition to the extent that they no longer fulfil the criteria for supplemental oxygen.

In some patients with severe COPD and COPD–OSAHS overlap syndrome, optimised treatment of the OSAHS may produce an objective improvement in indices such as the AHI or oxygen desaturation during sleep, but fail to improve symptoms or quality of life for the person. This would usually be because the severity of the person's COPD has the overriding influence on quality of life. Because use of non-invasive ventilation or CPAP equipment adds to the burden of therapy, consideration should be given to stopping these and using a symptom-management approach. This needs careful discussion with the person and their family or carers, including considering what they would like to do for COPD exacerbations and advance care planning when appropriate.

How the recommendations might affect practice

These recommendations reflect current practice and are not expected to lead to major changes in practice.

[Return to recommendations](#)

Supporting adherence to treatment for people with COPD–OSAHS overlap syndrome

[Recommendations 3.8.1 and 3.8.2](#)

Why the committee made the recommendations

There was no evidence available for people with COPD–OSAHS overlap syndrome. The committee agreed that the evidence reviewed for supporting adherence to CPAP in people with OSAHS could be extrapolated to treatments in people with COPD–OSAHS overlap syndrome.

How the recommendations might affect practice

The recommendations reflect best practice but are currently implemented to varying degrees across NHS settings and will involve a change of practice for some providers.

[Return to recommendations](#)

Information for people with OSAHS, OHS and COPD–OSAHS overlap syndrome

[Recommendations 4.1.1 to 4.1.5](#)

Why the committee made the recommendations

There was limited evidence from clinical studies on the information and support needs of people with OSAHS, and no evidence for people with OHS and COPD–OSAHS overlap syndrome, so the committee also used their clinical knowledge and experience to make the recommendations.

The committee discussed that providing appropriate information for people with OSAHS, OHS and COPD–OSAHS overlap syndrome is essential to help them understand their condition and access support and treatment. Attendance for sleep investigation, such as respiratory polygraphy, is likely to be higher if patients understand why these are being performed and what they entail.

The committee agreed that giving information about all aspects of treatment is likely to increase uptake and therefore effectiveness.

The committee noted that different sleep services provide their own information and were aware of useful resources produced by a number of organisations providing support to

patients.

How the recommendations might affect practice

The recommendations reflect current best practice.

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Context

This guideline covers obstructive sleep apnoea/hypopnoea syndrome (OSAHS), obesity hypoventilation syndrome (OHS), and chronic obstructive pulmonary disease (COPD) with OSAHS overlap syndrome, providing advice on investigating and managing these related conditions.

OSAHS is a common, but frequently unrecognised cause of serious disability that has important health and social consequences. It is characterised by recurrent episodes of complete or partial upper airway obstruction during sleep resulting in dips in oxygen level, autonomic dysfunction and sleep fragmentation. There are a number of clinical and physiological variants (phenotypes) of the condition, which may influence treatment response.

OHS occurs when people who are obese are unable to breathe rapidly or deeply enough, resulting in low oxygen levels and high blood carbon dioxide levels. It is usually associated with OSAHS or nocturnal hypoventilation, and people with OHS often have cardiovascular complications and other comorbidities.

COPD–OSAHS overlap syndrome is the coexistence of OSAHS and COPD, which combined can cause a greater degree of oxygen deficiency, and increased morbidity, compared with either condition alone.

These conditions can have a profound impact on people's lives, causing excessive sleepiness or sleep disturbance that affects social activities, work performance, the ability to drive safely and quality of life. Undiagnosed, these conditions are closely associated with serious health problems, including hypertension, diabetes, stroke and heart disease, and can shorten life expectancy.

High numbers of the population are affected by these conditions, and they are often undiagnosed; it is estimated that 5% of adults in the UK have undiagnosed OSAHS. Both COPD and OSAHS are common conditions and are estimated to coexist, as overlap syndrome, in about 1% of the adult UK population. OHS is of particular concern because of rising obesity; it is already estimated to affect 0.3% to 0.4% of the UK population, with prevalence likely to grow.

The availability of services for investigation and management is variable. Failure to treat

these conditions can result in an increased use of services and may leave people with a reduced quality of life. Highly effective treatment, in the form of continuous positive airway pressure (CPAP), is available. But approaches to CPAP therapy differ and there is a lack of guidance on when other forms of treatment, such as non-invasive ventilation, oral devices, lifestyle changes and surgery are effective. Adherence to therapy is known to be low, so advice on interventions to help with adherence is also a priority for this guideline.

This guideline is needed to improve recognition and management of OSAHS, OHS and COPD–OSAHS overlap syndrome, and ensure consistent provision of care. It gives advice to healthcare professionals on when and how to investigate, and how to manage each of these conditions. It also gives guidance on supporting people to adhere to treatment and providing follow-up.

Finding more information and committee details

To find NICE guidance on related topics, including guidance in development, see the [NICE topic page on sleep and sleep conditions](#).

For full details of the evidence and the guideline committee's discussions, see the [evidence reviews](#). You can also find information about [how the guideline was developed](#), including [details of the committee](#).

NICE has produced [tools and resources to help you put this guideline into practice](#). For general help and advice on putting our guidelines into practice, see [resources to help you put NICE guidance into practice](#).

Update information

Minor changes since publication

March 2025: Links were updated following publication of NICE's guideline on overweight and obesity management.

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