



# Lifestyle discussions:

## Sleep and type 2 diabetes

Healthy sleep is characterised by sufficient duration, quality, timing and regularity, and the absence of sleep disturbances and disorders. Adults are recommended to get at least 7 hours of sleep per night. Sleep disturbance can make diabetes more difficult to control and can have other detrimental effects on the immune system and mental health.

After excluding specific sleep disorders requiring specific advice, general brief advice can be helpful in improving sleep. Cognitive behavioural therapy (CBT) referral for chronic insomnia, and specialist referrals for obstructive sleep apnoea (OSA) and rarer sleep-related conditions, are indicated and can be highly effective.

### Why is sleep important in people with type 2 diabetes?

- Being well rested is important to maintain good health.
- Adults should get at least 7 hours of sleep per night. Children and teens need more.
- If people get less than 7 hours of sleep per night regularly, diabetes will be harder to manage because of insulin resistance, feeling hungrier the next day, craving high-carb junk foods, lowered brain glucose use, and increased cortisol and sympathetic nervous system activity.<sup>1</sup>
- Sleep deprivation (restriction to 5 hours sleep for 7 nights) in healthy individuals results in a 20%–65% decrease in insulin sensitivity.<sup>2</sup>
- Energy intake is thought to be about 385 kcal/day higher after partial sleep deprivation, with no change in energy expenditure or resting metabolic rate.<sup>3</sup>
- Short sleep, therefore, makes it harder to lose weight.<sup>4</sup> A recent Mendelian randomisation study has indicated that one hour shorter sleep duration increases visceral adipose tissue mass by 0.11 kg.<sup>5</sup>
- Poor sleep is also associated with higher blood pressure,<sup>6</sup> impairment of the immune system and higher levels of depression and anxiety.<sup>7</sup>

### Sleep physiology

- Sleep is controlled by: 1. the internal circadian clock; and 2. a homeostatic mechanism where the need for sleep increases in proportion to the duration of prior wakefulness.<sup>8</sup>
- Sleep cycles (90–110 minutes) are characterised by four non-rapid eye movement (NREM) stages, with stages 3–4 known as slow-wave sleep where the most restorative sleep occurs (mostly in the first one third of the night), and REM sleep stages that increase in length as the night progresses, being longest in the last third of a sleep episode.
- Human behaviour may override the physiologic mechanisms that control sleep (e.g. circadian misalignment caused by night shifts, long-haul travel and “social jet lag” [different sleep timing on weekdays and weekends causing sleep-deprivation and tiredness during the week, with a catch-up at the weekend]).
- “Chronotype” describes a person’s preference for a particular time of day, and this can have a strong effect on behaviour. “Night owls”, who have an evening preference, typically have greater misalignment between social rhythms and the circadian clock, and more social jet lag than people with intermediate chronotypes.

### Common sleep problems

- Insomnia: regular trouble falling and/or staying asleep.
- Obstructive sleep apnoea: disordered breathing during sleep leading to disturbed sleep and tiredness.
- Social jet lag: defined above.
- Shift work disorder: recurrent sleep interruption resulting in insomnia or tiredness.

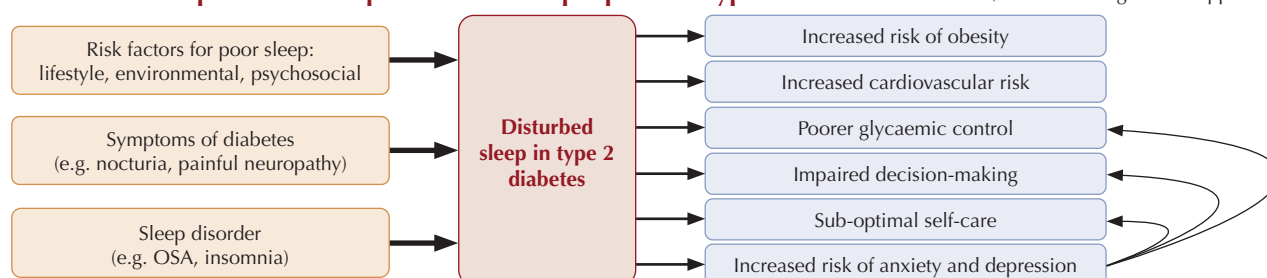
### Other sleep problems, not covered here

- Snoring: often distressing because of disturbance to partner’s sleep. Many regular snorers also have obstructive sleep apnoea.

- Restless legs syndrome: uncomfortable feelings in the legs relieved by moving the legs. In some people, it leads to sleep disturbance.
- Narcolepsy: unstable switching between being awake and asleep.
- Cataplexy: sudden muscle weakness.
- Sleep paralysis: inability to move or speak when waking or falling asleep.
- Sleep talking, nightmares, night terrors, sleep walking.
- Circadian rhythm sleep–wake disorders: a range of conditions affecting sleep timing.

### Causes and consequences of sleep disturbance in people with type 2 diabetes

(Further reading: see Schipper et al.<sup>9</sup>)



## Benefits of optimal sleep health in people with type 2 diabetes

- Better glucose and weight control.
- Improved energy, reaction times and physical performance.
- Lower blood pressure and lower risk of myocardial infarction.
- Better concentration, learning, memory, mood and mental health.
- Reduced infection risk and better response to vaccines.
- Lower risk of falls and accidents.

### Questions to ask to identify common sleep problems

- Are you a good sleeper?  
[**brief screening question**]
- Any difficulty getting to sleep or staying asleep? Is this occurring most nights? What disrupts your sleep? Is this persistent and affecting how you feel during the day (rested, energetic, tired, low mood)?  
[**insomnia**]
- Are you a very heavy snorer? Does your partner say that you sometimes stop breathing at night?  
[**obstructive sleep apnoea**]
- What time do you go to bed? What time do you get up? And how about weekends? Do you have regular sleep times? What is your work schedule?  
[**social jet lag/shift work disorder**]

### How can people with diabetes assess their sleep?

- **Sleep diary:** valuable, although self-reported sleep duration tends to be over-estimated.
- **Sleep questionnaire:** see [Resources](#) (following page) for example.
- **Wearable devices:** can assess sleep quite accurately. Options include watches (e.g. Fitbit Alta HR), rings (e.g. Oura) or smartphone apps (e.g. Pillow).<sup>10</sup>
- **Bedside or bed devices:** collect data about movement, breathing and heart rate.
- **Polysomnography:** gold standard, but usually involves specialist referral and a night in a sleep lab.

## How to access CBT for insomnia (CBT-I)

- GPs should address circumstances associated with insomnia, ensuring that comorbid conditions, such as anxiety or depression, are optimally managed.
- Offer advice on sleep hygiene.
- For long-term (>3 months) insomnia that is unlikely to improve rapidly with advice or sleeping pills, NICE advises GP referral for face-to-face CBT-I. However, availability is limited in the UK.
- Digital self-help programmes (e.g. Sleepio) are funded by the NHS in some UK regions. Sleepio and Sleepstation can also be [self-funded](#).
- In people with type 2 diabetes, medical assessment is advised before CBT-I referral to exclude other sleep disorder conditions.

## How to access obstructive sleep apnoea diagnosis and management

- Guidelines recommend against screening for OSA in all adults with diabetes, as there is insufficient evidence that treating OSA improves outcomes and the screening questionnaires are not well adapted for people with diabetes.<sup>11</sup>
- However, it is recommended that screening is considered if there

- is excessive daytime sleepiness, witnessed apnoeas, heavy snoring, and/or refractory hypertension. Recommendations for screening are questionnaires (e.g. STOP-Bang, Epworth or Berlin) or evaluation at home with overnight pulse oximetry, if available in primary care.
- If sleep apnoea is suspected, GP referral to a specialist sleep clinic is indicated.
- Diagnostic investigations are likely to include overnight pulse oximetry at home or in the clinic.
- OSA may contribute to the progression of diabetes complications (e.g. peripheral neuropathy).<sup>12</sup>
- Studies show that continuous positive airway pressure (CPAP) improves sleep quality, although meta-analyses have not shown an improvement in HbA<sub>1c</sub>.<sup>13</sup>
- Weight loss is effective in reducing HbA<sub>1c</sub> and OSA symptoms.<sup>14</sup>
- Contrary to what would be expected, CPAP treatment for OSA leads to ~0.5 kg weight gain on average.<sup>15</sup>
- Confirmed moderate or severe OSA with excessive sleepiness and any other sleep condition that has caused excessive sleepiness for at least 3 months (including suspected or confirmed mild OSA) must be reported to the DVLA.

## General advice to improve sleep – sleep prescriptions

- **Regularity:** Aim to wake up and go to bed at around the same time every day, even on weekends.
- **Tiredness:** Aim to get in bed only when you're tired.
- **Restful environment:** Keep your bedroom dark, quiet, relaxing and cool (~18°C).
- **Relax:** Mentally unwind and relax before bedtime (e.g. take a bath or read a book).
- **Remove devices** such as TVs, computers and smartphones from the bedroom and minimise use of technology from 2 hours before bed. High-intensity blue light from LED/LCDs in the evening can disturb sleep. This wavelength has the highest impact on the photosensitive retinal pigment melanopsin and can suppress melatonin secretion. However, the evidence regarding the effectiveness of blue light-blocking glasses on sleep traits is inconsistent.
- **Light exposure and activity:** Get natural light exposure and be active during the day, and reduce light exposure in the evening.
- **Confront sleeplessness:** Don't clock-watch during the night. If you are lying awake unable to sleep, get up and do something relaxing for a bit, then return to bed.
- **Avoid** afternoon and evening caffeine, alcohol in the evening, large meals late at night, naps after 3 p.m., exercise within 4 hours of bedtime, screen time before bed, "sleeping in" after a bad night's sleep and smoking.
- **Write down your worries:** If you often lie awake worrying about tomorrow, set aside time before bed to make a list for the next day.
- **GP discussion:** If you still have problems sleeping, then talk again with your doctor.

## Recent evidence on sleep disturbance in type 2 diabetes with relevance to comorbid conditions

- It is important to identify specific sleep disorders because recent research confirms how common they are in people with type 2 diabetes:
  - Insomnia, 39%
  - Moderate-to-severe OSA, 24%–70%
- Be aware that shift workers with type 2 diabetes have higher HbA<sub>1c</sub> levels, poorer mental health and more microvascular complications.<sup>16</sup>
- Robust data from Mendelian randomisation studies suggest that: a) frequent insomnia can cause higher HbA<sub>1c</sub> levels,<sup>17</sup> obesity<sup>18</sup> and coronary artery disease;<sup>19</sup> and b) short sleep has a causal role in myocardial infarction.<sup>20,21</sup>
- Sleep disturbance is associated with depression in type 2 diabetes.<sup>22</sup>
- Also be aware that short sleep duration is a risk factor for incident obesity and worse outcomes after weight loss interventions.

## Evidence that intervention is helpful in people with type 2 diabetes

- Clinical trials of the effects of treating sleep disorders in type 2 diabetes are scarce.
- Pharmacological: small studies of selective orexin receptor antagonists and melatonin suggest some benefit on glycaemic control.
- Weight loss is an effective treatment for OSA and type 2 diabetes.
- Sleep education: data suggest improvement in sleep quality and possible benefit on glycaemic control.



### Very brief advice for people with type 2 diabetes

- Sleep disorders are common in people with diabetes.
- Not sleeping properly makes diabetes control more challenging, and increases your risk of developing complications from diabetes and conditions associated with diabetes.

- CBT: a small study suggests an HbA<sub>1c</sub> improvement and reduction in depressive symptoms.<sup>23</sup>

## Sleep as part of international type 2 diabetes guidelines

- The 2022 ADA/EASD Consensus Report update includes, for the first time, acknowledgement that sleep is an important modifiable behaviour in lifestyle management of diabetes.<sup>24</sup>
- The ADA recommends that an assessment of sleep pattern and duration should be part of the comprehensive medical evaluation in people with diabetes.<sup>25</sup>

- Poor sleep makes you more likely to overeat, make poor food choices and you may find it harder to lose weight.
- Management usually involves screening for treatable disorders that affect sleep, and behaviour change to improve sleep hygiene. It may also include referral for CBT-I.
- Treatment improves quality of life and health outcomes.

## Resources

### For healthcare professionals

- Impact of sleep and circadian disturbances on type 2 diabetes: <https://bit.ly/2Mi2jWs>
- NICE guidance on Sleepio for insomnia: <https://www.nice.org.uk/guidance/mtg70>
- Advice for shift workers: <https://bit.ly/3rBr4jd>

### For people with diabetes

- NHS sleep questionnaire: <https://bit.ly/3SjzN8a>
- General NHS advice: <https://bit.ly/3yoc3hD>
- NHS advice on insomnia: <https://www.nhs.uk/conditions/insomnia>
- Guidance on Sleepstation for insomnia: <https://bit.ly/32Tn219>
- NHS advice on sleep apnoea: <https://www.nhs.uk/conditions/sleep-apnoea>
- Advice for people with diabetes: <https://bit.ly/3T3iheU>

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