

Sleep-disordered breathing (SDB) in heart failure (HF)

Fast facts

- Europe has an estimated 15 million patients suffering from heart failure (HF)¹ and, as life expectancy increases, it is likely so will this disease.^{2,3}
- Sleep-disordered breathing (SDB) is one of the most common co-morbidities in people with chronic HF and is estimated to be present in 50-75% of patients.^{4,5,6,7,8}
- SDB causes a variety of issues that can put additional stress on a failing heart. The condition has therefore been linked to poorer outcomes in this patient population.⁹
- Despite high prevalence and potentially serious effects, the diagnosis and correct treatment of SDB in HF remains low.¹⁰
- The two main types of SDB are obstructive sleep apnoea (OSA) and central sleep apnoea (CSA), the latter is often associated with Cheyne-Stokes respiration (CSR).⁸
- CSA-CSR is a form of sleep apnoea that is common in HF patients, where periods of hyperventilation alternate with central apnoeas (prolonged airflow pause) and/or hypopnoeas (air flow reduction).⁸
- In Europe, it is thought that anywhere between 4-7 million people are suffering with HF combined with CSA-CSR, and could therefore be at increased risk of death compared to people with HF alone.^{2,3,10,11,15}
- CSA-CSR can be effectively treated with Adaptive Servo-Ventilation (ASV); a non-invasive ventilator therapy where an easy-to-fit mask carefully senses breathing patterns and makes intelligent adjustments that stabilise breathing.⁸

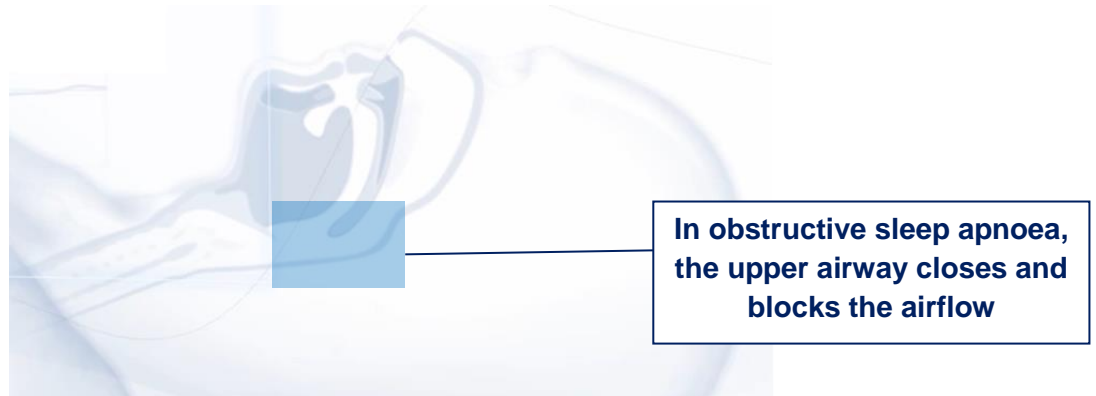
Heart failure (HF)

- HF is a common, costly and potentially fatal condition, which occurs when the heart is prevented from, or is unable to pump enough blood to maintain the body's needs.¹²
- Common symptoms of HF include breathlessness or fatigue, either at rest or during exertion, ankle swelling and evidence of cardiac dysfunction at rest.¹³

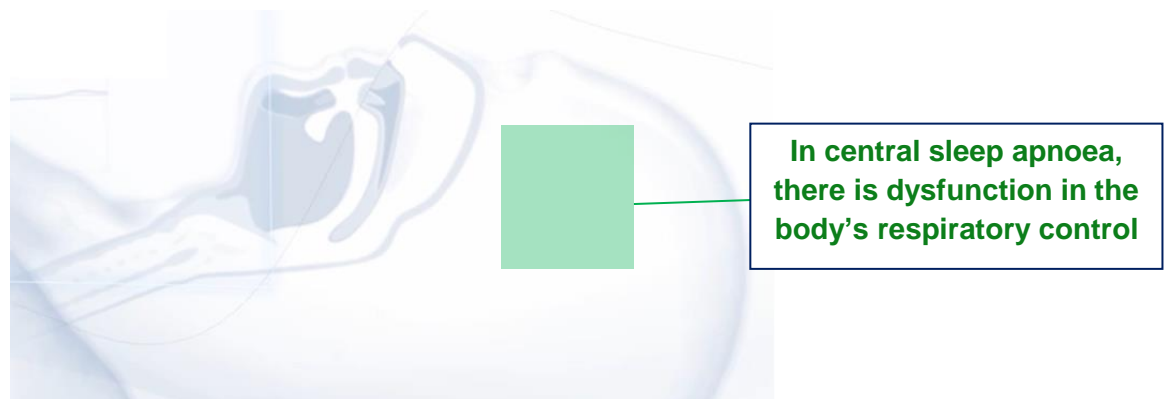
Sleep-disordered breathing (SDB), also known as sleep apnoea

- SDB is a term commonly used to describe abnormal breathing during sleep. It usually refers to a patient whose breathing rate increases and/or decreases in an unusual fashion, leading to pauses in breathing and reduced blood oxygen saturation levels.⁸
- SDB has been linked to a number of potentially harmful health issues, however it is commonly recognised to disrupt sleep, lead to a low oxygen saturation level and cause, or exacerbate, cardiovascular complications such as HF.⁸

- The decrease of breathing flow in SDB is referred to as:
 - Apnoeas (where breathing flow stops for an abnormally long period of time)
 - Hypopneas (where breathing flow significantly decreases).¹⁴
- The two most common forms of SDB are:
 1. **Obstructive sleep apnoea (OSA):**
Obstruction of the upper airway causes repetitive pauses in breathing during sleep.⁸

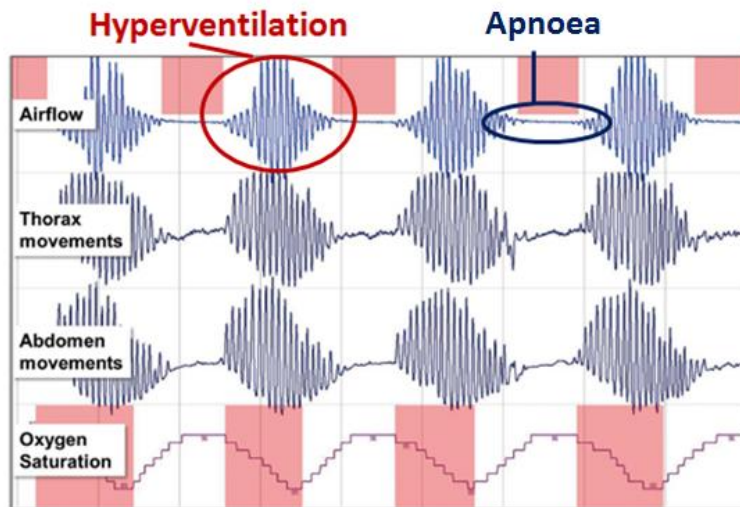


2. **Central sleep apnoea (CSA)**
Malfunction of the body's natural respiratory control causes a lack of drive to breathe during sleep. This results in periods of insufficient ventilation and compromised oxygen supply.



- **Cheyne-Stokes respiration (CSR)** is another form of SDB, characterised by periods of hyperventilation, alternating with periods of breathing cessation (central apnoeas/hypopneas). This causes waxing and waning of breathing effort.
- **Central sleep apnoea with Cheyne-Stokes respiration (CSA-CSR)** is a common type of SDB in patients with HF, occurring in 30-50% of them.^{15,11}

The below is an excerpt of a polygraphy recording of a HF patient with nocturnal CSA-CSR. This shows the waxing-waning breathing pattern associated with this condition and the increasing and decreasing oxygen saturation levels these patients experience.¹⁶



SDB in HF

- Among multiple HF co-morbidities, SDB is one of the most common. However it remains the one of the least recognised by cardiologists.⁸
- CSA-CSR can occur as a consequence of HF, and can be associated with increasing severity of the condition.¹⁶
- Both OSA and CSA-CSR interfere with neurohumoral systems*, which may intensify a patient's HF condition.¹⁵ Deprivation of oxygen affects the sympathetic nervous system, worsens the vascular endothelial function and puts additional stress on the heart.¹⁷
- Studies have indicated that a patient with HF and CSA may have a significantly reduced quality of life, compared to that of one with HF alone.¹⁸
- In addition to increasing the risk of death, it has also been shown that CSA may significantly increase the chance of cardiac hospital readmissions in HF patients.^{9,10,19}

*Neurohumoral activation refers to increased activity of the sympathetic nervous system, renin-angiotensin system, vasopressin and atrial natriuretic peptide.

Treating SDB in patients with HF

Effective treatment of SDB can improve cardiac function and may improve survival in patients with HF.^{6,20}

Obstructive sleep apnoea:

Moderate to severe cases of sleep apnoea may need to be treated using a type of treatment called continuous positive airway pressure (CPAP). This involves using a flow generator to

prevent upper airway closure and consequent breathing interruption while asleep, by delivering air flow through a mask

Central sleep apnoea / CSA-CSR:

- Treating CSA-CSR requires a more advanced ventilation therapy, called adaptive servo-ventilation (PaceWave™ ASV), which has shown:
 - To normalise the Apnoea-Hypopnoea-Index (AHI) and nocturnal breathing pattern, thus enabling breathing stabilisation and sleep quality improvement in patients with HF and CSA-CSR⁸
 - To significantly increase cardiac function⁸
 - To have potentially beneficial effects, particularly improvements in quality of life¹⁶

References

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